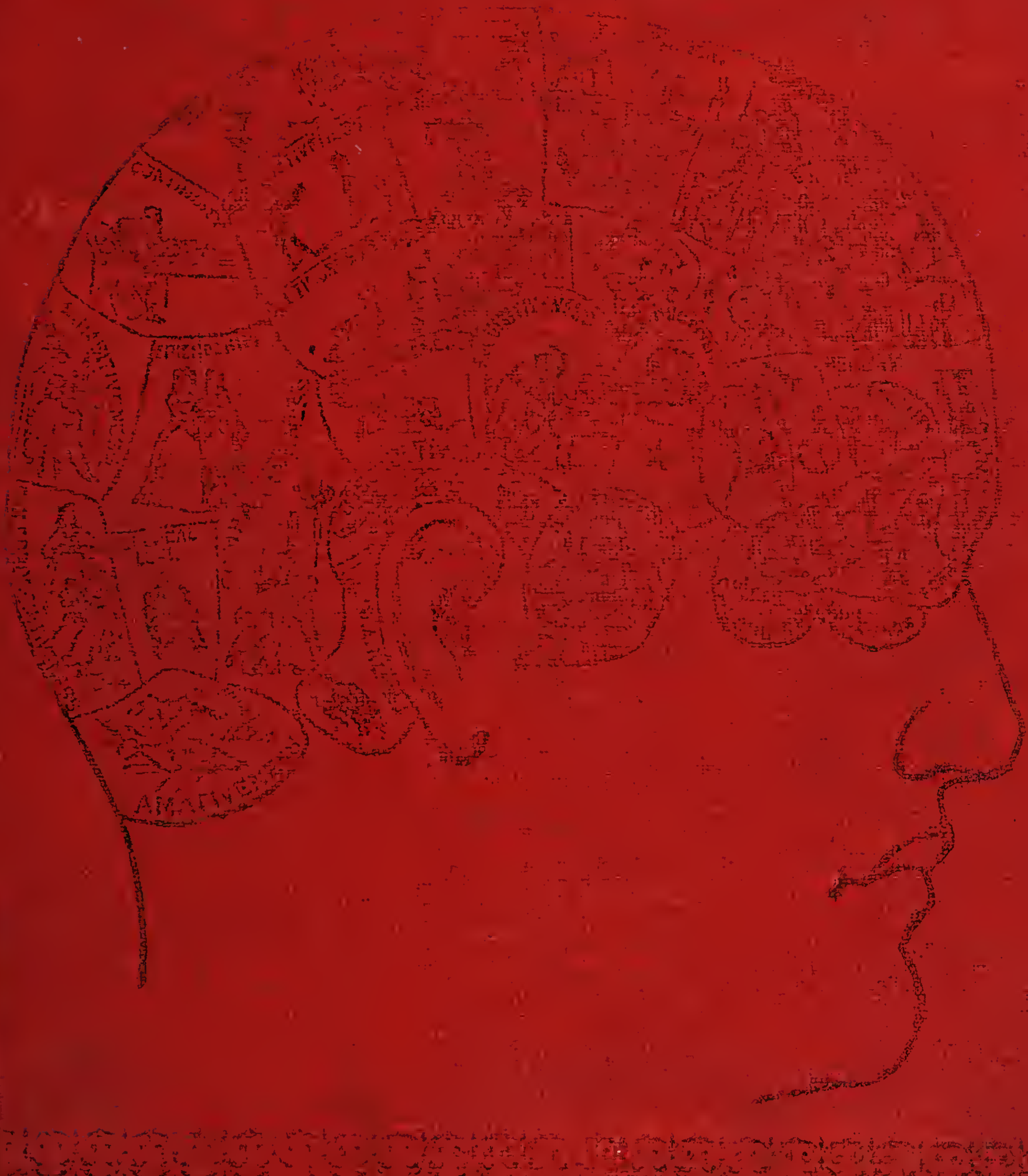
PHRENOLOGICAL
AND
Medical Hints.



ROLAND KILEY.

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PHRENOLOGICAL

AND

MEDICAL HINTS

BY

ROLAND KILEY,

Phrenologist and Physiologist.

In giving advice, or while instructing, we must consult the gentlest manner and softest reasons of address; our advice must not fall like a violent storm, bearing down, and making that to droop which it was meant to cherish and refresh; it must descend as the dew upon the tender herb, or like melting flakes of snow; the softer it falls, the longer it dwells upon, and the deeper it sinks into the mind.

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PHRENOLOGY.

It takes cognizance of the child as it sits upon its mother's knee, and informs its parents how to train it up in accordance with nature's requisitions, so that it may become an ornament to society and a blessing to its parents.

It visits the schoolmaster, and informs him how to call out and develop every faculty of the child that is entrusted to his care; explains why a child excels in one branch of learning but cannot comprehend the principles of another, and throws out valuable suggestions for the proper guidance of those qualities essential to their mental and physical greatness.

It rushes to the rescue when parents are about to send their children to learn a trade or profession, and informs them that if misplaced they never can enjoy themselves, and will thus be compelled to drag out a miserable existence. It would inform them with unerring certainty what they are organized for, and thus prevent many disappointments in life.

It laments over family broils, mourns with those people that are "unequally yoked together," and suggests an improvement in the marriage relation. It informs lovers that if suitably mated their lives would be rendered happy by the union ; but if not organised for each other, they ought not to marry, for their lives would be rendered miserable by such a match.

It appeals to legislators when they are making laws for the suppression of crime, and when they are framing laws for the management of the insane, and demands from them such laws as shall accord with sound judgment.

It would picture a man's mind on canvas and hold it up for him to look at, with its beauties and deformities strangely congregated. It would then point out its weaknesses and eccentricities, and tell him how to overcome them ; how to curb its passions and empower its energies ; how to refine its coarseness, enlighten its reason, purify its love, elevate its sentiments, beautify, adorn, and perfect its character. It would give him that knowledge by which he would become acquainted with himself, by which he could harmonise his mind, and thereby make the most of his talents.

In short, it would lay a sure foundation for a higher, purer, nobler, truer race of men and women with which to construct the sumblimely noble fabric of a peaceable, harmonious, religious, enlightened, and happy society.

THE BRAIN.

Recollect that it is the brain that leads us to all our actions, therefore as a man's actions are, so is his brain. For this reason notice what angers a man, and what does please him ; notice his walk and talk, his quickness or slowness, and what draws him out most. Notice the shape of his head ; the more head there is above the top line of the forehead, the greater the moral power is ; the fuller the head is at the back, the more social power there is; and the wider men and women are between the ears, the more pushing or executive power there is. Of course these rules only hold good where the brain is of proper quality. People with water on the brain are exceptions. Whatever part of the brain is exceptionally large, it will influence the person more than the opposite part which is less developed, but training will alter that influence.

Man is composed physically of three great classes of organs; the predominance or deficiency of each of which is called a predominant or deficient temperament, both giving a particular shape or form to the body or phrenological organs.

THE TEMPERAMENTS.

There are four temperaments—namely, the Sanguine, the Lymphatic, the Fibrous or Bilious, and the nervous. The sanguine temperament may be distinguished by a florid or light complexion; blue eyes, sandy-coloured hair, large features, and coarse habits. This temperament enjoys life, and has a tendency to indulge the animal passions. The lymphatic temperament may be known by the sluggish habits of the individual; soft flabby skin; the lower part of the face being larger than the upper part. The individual is of a free and easy nature. The bilious temperament may be known by dark strong hair, large cheek bones, and a sallow complexion. Persons of this temperament are generally strong and hardy. The nervous temperament is known by small features, spare built frame, fine silk hair, and the upper part of the head being larger than the lower part. Persons of this temperament are quick and active, but soon fatigued. The temperaments indicate the several qualities of the brain, without a knowledge of which every medical practitioner is liable to make serious mistakes.

Phrenology teaches that the brain is divided into a number of organs, each the seat of a separate and distinct faculty, and sub-divided into three classes, viz.: the Animal Propensities, situate at the base and posterior parts of the skull; the Intellectual Faculties located at the anterior or fore part of the head, and the Moral Sentiments situate at the top or coronal region. These again are divided into the following :—

SOCIAL GROUP.—*This group indicates the desire to live in Society, and form social unions, marriages, &c.*

Amativeness—Moral use—sexual instinct, propagation.

Philoprogenitiveness—Moral use—parental affection, love for children in general.

Inhabitiveness—Moral use—love of home, attachment to country.

Adhesiveness—Moral use—friendship, sociableness, love of society.

Marriage—Moral use—desire to unite in marriage.

DEFENSIVE AND AGGRESSIVE GROUP.—*This group gives the desire and power to repel and overcome danger.*

Combativeness—Moral use—to oppose aggression; courage.

Destructiveness—Moral use—to kill for food, to destroy noxious objects.

PRESERVATIVE GROUP—*This group tends to the immediate preservation and maintenance of the individual.*

Alimentativeness—Moral use—discrimination in the choice of food.

Acquisitiveness—Moral use—to possess what is useful and necessary.

Constructiveness—Moral use—to build and construct works of art, &c.

RESTRAINING GROUP.—*This group restrains the manifestations of all the faculties, and gives prudence.*

Secretiveness—Moral use—to conceal emotions and thoughts with prudence.

Moral use—circumspection in general, provision against danger.

Caution—Moral use—Watchfulness, circumspection in general.

DIGNITATIVE GROUP.—*This group produces character, and prompts ambition and high-toned pride.*

Love of approbation—Moral use—desire to please, and to stand well with others.

Self-esteem—Moral use—self-respect, dignity, pride of character.

PRESERVING GROUP.—*This group induces perseverance and unity, and continuity of mental action.*

Concentrativeness—Moral use—unity and continuity of thought and feeling.

Firmness—Moral use—stability, resolution, fixedness of purpose.

MORAL RULING GROUP.—*This group induces obedience to the moral law.*

Benevolence—Moral use—kindness, desire for the happiness of all.

Conscientiousness—Moral use—honesty, honour, sincerity.

RELIGIOUS GROUP.—*This group induces to the worship of God in faith and spirit.*

Veneration—Moral use—to reverence that which is great and good, humility.

Hope—Moral use—to rely on the future for happiness and success.

Marvellousness—Moral use—admires the new, belief in the spiritual.

PROGRESSIVE GROUP.—*This group prompts to progress, refinement, and human elevation.*

Imitation—Moral use—to imitate what we see in others.

Humorousness—Moral use—cheerfulness, humorous, joyous.

Ideality—Moral use—desire of perfection, taste for the lovely.

Sublimity—Moral use—a sense of grandeur and the sublime in nature and art.

SIMPLE PERCEPTIVE GROUP.—*This group takes cognizance of facts, phenomena, and the conditions and qualities of things and remembers them.*

Individuality—Moral use—to perceive and remember individual existences.

Form—Moral use—to perceive configuration and remember it.

Size—Moral use—to perceive and remember extension, height, and depth.

Weight—Moral use—perception and memory of mechanical forces.

Colour—Moral use—to perceive and remember colours.

RELATIVE PERCEPTIVE GROUP.—*This group perceives and remembers the relation of things in time, place, event, and number.*

Locality—Moral use—to perceive and remember places.

Number—Moral use—to perceive and remember numbers.

Order—Moral use—to perceive and remember the order of things.

Eventuality—Moral use—to perceive and remember active and passing events.

Time—Moral use—to perceive and remember the relations of time.

Tune—Moral use—to perceive and remember the harmony in sounds.

EXPRESSIVE AND REFLECTIVE GROUP.—*This group perceives and remembers the relations of the other perceptions, and expresses ideas in words.*

Language—Moral use—to perceive and remember words, and express ideas.

Comparison—Moral use—to perceive and remember analogies, either in things or ideas.

Causality—Moral use—to perceive and remember the relation of cause and effect.

Human nature—Moral use—an ability to read the character and motives of others.

Having given the names of the organs, I now ask you to notice how to point out whether a person has any organ, large or small.

In giving phrenological delineations of individuals the phrenologist gives a scale of degrees from 1 to 7.

7 means the faculty is very large, and 1 means the organ is very small. By cultivation or use, a weak organ becomes strong. In order to give the reader some idea of this scale of degrees, I shew how some of the organs are graduated.—By restraining an organ we weaken it.

EXCITABILITY.

7. *Very large.*—You are intensely susceptible to impressions of all kinds. Very easily excited. Subject to extremes of feeling, greatly exalted at one moment, and much depressed the next; apt to magnify good, bad, everything far beyond the reality. A creature of impulse and mere feeling. Extremely liable to neuralgia and nervous affections.

6. *Large*—You are full of soul, and too susceptible to external influences for your own welfare, or that of your friends.

5. *Full.*—You are easily roused, but not easily carried away by excitements; are somewhat self-possessed, and act coolly and with forethought.

4. *Average.*—You are swayed but little by external influences, and act more from judgment than from impulse; have a quiet spirit, and evince much calmness.

3. *Moderate.*—You are rather dull, and need forcible motives to bring out intensity of feeling; are generally depressed in spirit, seldom enthusiastic, slow to perceive and feel, and allow yourself to be imposed upon rather than put yourself out of the way to defend your own interests.

2. *Small.*—You possess too little spirit to become interested in anything; are half asleep all day long, and too monotonous and mechanical in everything.

1. *Very small.*—You are really stupid, and almost lifeless.

To cultivate.—Seek amusements and excitements, attend political gatherings, and endeavour to feel that you were born to make a noise in the world as well as other people.

To restrain.—Avoid excitants, irritants, and stimulants of all kinds. Eat freely of vegetables, and sleep as much as possible. Bathe daily, and drink neither tea nor coffee. Spend much of your time in a quiet place.

SIZE OF BRAIN.

The average circumference of a full-grown male brain is 22 inches; the female 21½ inches. Average weight of the full-grown male brain is 45 ounces. Average weight of the full-grown female brain is 41 ounces.

7. *Very large.*—You are a mental genius if the quality and balance of organisation be equally good; are capable of astonishing the world by the comprehensiveness of your mind. Such a mind backed up by adequate physical stamina, will overcome all obstacles, and achieve greatness in spite of all difficulties.

6. *Large.* —With quality and activity 6 or 7. Yours will be a mind of great reach and power, and you are likely to sway a commanding influence over others.

5. *Full.*—With quality or activity 6 or 7. You are capable of accomplishing much, and attaining a high position in society. You possess good talent and are capable of doing a fine business, but have not that commanding and all-conquering genius which can bend everything to its will.

4. *Average.*—Under favourable circumstances are capable of doing a fair business, but have not so much comprehensiveness of mind as to render you adequate to very complicated undertakings.

3. *Moderate.*—Have not much influence on those around you, but are capable of manifesting good talent

and of succeeding well in a business for which you are specially fitted; but out of this sphere, your abilities would become common-place, for you are neither original nor profound. You take too contracted views of subjects.

2. *Small.*—You have only a very limited range of ideas; are incapable of managing any business.

1. *Very small.*—Are imbecile and cannot take care of self.

To cultivate.—Read, study, and think as much as possible.

DOMESTIC PROPENSITIES.

AMATIVENESS.

Love between the Sexes; Desire to Caress, Kiss, and Fondle; Attachment to the Opposite Sex. *Excess*—Sensuality, Licentiousness, *Deficiency*—Cool-heartedness and Want of Love to the Opposite Sex.

7. *Very large.*—You have a very strong sexual desire; are irresistibly attracted by the opposite sex, and are capable of exerting a similar power over them; are winning in your manners; yearn continually for the caresses and endearment of affection, and are made utterly miserable by coldness and indifference on the part of the one beloved.

6. *Large.*—The love element is a very influential one in your organisation, and will affect powerfully, for good or for evil, your destiny in life; you are strongly attracted by the opposite sex, especially when they possess refined and exalted minds; you are also strongly attracted by personal beauty, and seek in the other sex good bodily develop-

ment. If Conjugality be also large, your love will be of the real conjugal sentiment, and manifest the most clinging fondness and utmost devotion for the one beloved.

5. *Full.*—You are capable of considerable fervour of attachment; can love devotedly and warmly, but not passionately, and the sexual feeling is more excitable than powerful; are very attentive towards those you love, but your desires are easily controlled.

4. *Average.*—You are capable of fair sexual attachments, but are not very ardent in feeling, and may sometimes manifest much coldness and indifference; could enjoy the marriage relation, but need to have your love called out and cherished by a loving companion. With large Ideality, you would manifest more admiration than affection for the opposite sex.

3. *Moderate.*—You are rather cold and indifferent towards the other sex, and love their mental excellences more than their personal charms; manifesting more friendship and respect than love, and find it difficult to sympathise with a conjugal partner unless the natural harmony between both is well nigh perfect, and could live unmarried without much inconvenience. You are not likely to be a favourite with the opposite sex.

2. *Small.*—You are deficient in love, and could not live happily if married; your nature is cold, distant and reserved, and will experience but little of the beautifying and elevating influences of love.

1. *Very small.*—You should never marry, because destitute of the love element.

To cultivate.—Go more into the society of the opposite sex; observe and appreciate their excellences and overlook their faults ; be as warm, tender, agreeable, and loving as possible ; be as lively and entertaining as you know how to be, and try to cultivate a warm intimacy with some congenial spirit ; be less fastidious and more free and communicative ; if married, get up a second and improved edition of courtship.

To restrain.—You should direct the love element more to the mental and less to the personal qualities of the other sex, and remember that no passion is so destructive and dangerous when uncontrolled ; live on a vegetable diet, and avoid all stimulants, excitants, and irritants ; seek the society of the virtuous and good, and love them more for their minds than for their bodies ; avoid the society of the vulgar ; endeavour to hold the passions in subjection by strict mental discipline, and by the avoidance of alcoholic drinks and tobacco ; you should also bathe daily in cold water, and exercise much in the open air.

CONJUGALITY.

Desire to Marry ; Attachment to one Conjugal Partner ; Constancy. *Excess*—Jealousy ; Excessive Attachment ; Envy towards Love Rivals. *Deficiency*—Inconstancy of Love.

7. *Very large.*—You are so devotedly attached to one object as to be blind to all others, the faults of whom you will ever be ready to conceal or overlook, and you will require the same exclusive attachment in the one beloved. If not married, you should be very careful to bestow your affections where they will be fully reciprocated, for any failure in this respect would be likely to affect very seriously your destiny in life.

6. *Large.*—You have strong conjugal affinity, and experience the keenest disappointment when love is interrupted. A life of single blessedness is not suited to your taste; you are restless until the affections are anchored, and are then perfectly satisfied with the society of that one. You would tolerate almost anything in him or her, except infidelity to the marriage relation.

5. *Full.*—You can love cordially and faithfully any person of the other sex upon whom your affections may be placed. Yet will not bear everything from a lover or companion ; and if one love is interrupted, you can readily form another.

4. *Average.*—You are inclined to love but one for life, but can easily change the object of your affections ; and with Adhesiveness small and Conscientiousness moderate, and the Temperament more powerful than fine grained, may be coquettish.

3. *Moderate.*—Can form one attachment after another, and under favourable circumstances may be true as a husband or wife, but are not likely to be so as a lover ; are liable to be led astray by new faces, and to allow an old love to be supplanted by new ones.

2. *Small.*—You are deficient in conjugal love, and are inclined to the promiscuous society of the other sex. Your love is as changeable as the wind.

1. *Very small.*—You possess no conjugal affection are fickle and inconstant, rather.

To cultivate.—Endeavour to love continuously and permanently some congenial spirit, and do not allow new faces to awaken new loves ; be much in the company of the one already beloved, and avoid promiscuous society.

To restrain.—Avoid idolatry and jealousy ; if a first love dies or is blighted, do not allow yourself to pore over the bereavement ; try to appreciate the excellences of others ; seek society, and try to find a suitable object upon whom to bestow your affections, remembering that " there are as good fish in the sea as ever were caught."

PARENTAL LOVE, OR PHILOPROGENITIVENESS.

Love of Children, Pets, and Animals ; Desire to be a Parent. *Excess*—Leads to Humouring, Pampering, and Spoiling Children ; Over-indulgence. *Deficiency*—Neglect of Children and Animals.

7. *Very large.*—You are passionately fond of children, and as, a parent, you are likely to idolise your offspring, and probably spoil them by pampering and hurtful indulgence, or by allowing them to rule instead of yielding obedience. With large Cautiousness and disordered nerves, you are liable to feel a word of groundless apprehensions about them ; with large Acquisitiveness lay up fortunes for them ; but with large moral and intellectual organs are indulgent, yet love them too well to spoil them.

6. *Large.*—As a parent you would be tender and indulgent, perhaps to a fault ; value offspring above all price, and are apt to overlook the faults and imperfections of your young favourites, whether they are your own children or those of your friends. You are passionately fond of the society of the young, who are equally fond of you. This faculty should be kept under the control of moral principle, or it will lead to harm rather than good to

the little ones you love so well. You are also very fond of pets and animals.

5. *Full.*—You are capable of loving your own children well, yet not passionately; do much for them, yet not more than necessary.

4. *Average.*—Your own children will meet with a fair share of love, but you will care little for those of others, neither have you much patience with children when they are cross and troublesome; you should cultivate parental fondness by forbearing with their faults and by soothing their troubled minds.

3. *Moderate.*—You are rather indifferent even towards your own children, if you have any; cannot endure to hear them cry, make a noise, nor disturb things; you should try to win their affections by being more tender and forbearing.

2. *Small.*—You are very liable to neglect both your own children and those of others.

1. *Very Small.* You possess no parental love, and hate to be troubled with the young.

To cultivate.—Associate freely with children; overlook their faults; interest yourself in their play and foibles; sympathise with them in their joys and sorrows, and always be tender and indulgent towards them.

To restrain. Remember that you are too liable to spoil children and pets by over-indulgence; set judgment against affection, and give yourself less anxiety about them.

FRIENDSHIP.

Social Feeling; Desire to Congregate and form Friendships; Love of Society. *Excess*—Inordinate attachment to Friends; Often leads to Bad Company. *Deficiency*—Cold-heartedness; Unsocial and selfish feeling.

7. *Very large*—You are exceedingly warm-hearted, and very liable to make many sacrifices for your friends; are too much wrapt up in them for your own welfare or peace of mind, for you are blind to their faults and defects; unless you keep this faculty in subjection and regulate it by your intellect, it may cause you much trouble and anxiety when friends forsake you.

6. *Large.*—You are very social, warm-hearted, and affectionate; readily form friendships, and must have society of some kind; will cling to those you love through all changes of time and circumstance; you should be very careful in the choice of your friends, for you are liable to suffer much from the unworthiness and ingratitude of those to whom you may become attached; this strong attachment is also capable of making you many friends in return.

5. *Full.*—You are highly social and companionable with those whom you deem worthy; yet not remarkably warm-hearted, and are not disposed to sacrifice too much in their behalf; are cordial in your intercourse with those around you and disposed to make friends, but your attachments are not always lasting, for you do not bind others to you by very strong bonds of affection; will have a few warm friends, yet only few, but perhaps many speaking acquaintances.

4. *Average.*—You are capable of tolerably strong friendships under favourable circumstances, but will not be likely to mourn greatly over the absence of friends; are very choice in their selection, and rather too distant when they conflict with your interests.

3. *Moderate.*—You are rather cold-hearted and distant in society, and form but few attachments, and if you make friends, it is more likely to be through some good qualities you may possess than through your social nature. You are also very apt to make friendship subservient to interest.

2. *Small.*—You possess very little love for society, and are cold and indifferent towards those around you; have neither the desire nor the ability to make friends, and prefer to be alone.

1. *Very small.*—You are an entire stranger to friendly feeling, and prefer a hermit's life.

To cultivate.—Associate freely with those around you; open your mind; don't be too exclusive and distant, and strive to be as companionable as possible; go more to parties, and do not refuse to affiliate with those not exactly to your liking, but like what you can and overlook faults.

To restrain.—Be more select in choosing your friends, and guard against being too easily persuaded by those in whom you confide; subject friendship to intellect, and avoid making more sacrifices than your means will permit without injuring yourself.

INHABITIVENESS.

Love of Home; Patriotism; Attachment to Country; Desire to Locate and Remain in one Place. *Excess*—Excessive Attachment to one's Native Place. *Deficiency*—Lack of Patriotic Feeling; Neglect of Home.

7. *Very large.*—Your regard for home is exceedingly great; are liable to home sickness when away; are preeminently patriotic, and would forego bright prospects rather than leave home; you prefer poverty and the

humblest position in life at home to wealth and station abroad.

6. *Large.*—You have a strong desire to locate young, to have a home or room exclusively; and would leave your place of abode with great reluctance and return with extreme delight; domestic associations are highly prized by you, and desire, almost above everything else, to have a home of your own.

5. *Full.*—Your love for the old homestead is great, and prefer to live in one place, yet willingly change when circumstances require it, and are not likely to get homesick, even if compelled to remain absent for a long time; you are disposed to make your home in that locality which suits your pecuniary affairs.

4. *Average.*—Your love for home is fairly represented, but can change your place of abode as circumstances require without much regret. With large Locality will be fond of travelling.

3. *Moderate.*—Your attachment to home is very limited you take little pains with it, and are not inclined to spend much money in its improvement, or in surrounding yourself with home comforts. With Continuity small, will enjoy constant change of scene.

2. *Small.*—Will form but few local attachments, and are a rolling stone.

1. *Very small.*—You prefer a rambling life to one more localised.

To cultivate.—Stay more at home, and render it as attractive as possible; cultivate a love of its associations and joys, and turn your back upon all rambling influences.

To restrain.—Go more abroad; read books of travel, and become as interested as possible in the institutions of other countries.

CONTINUITY.

Connectedness of Thought and Feeling; Application; One thing at once. *Excess*—Prolixity and Excessive Amplification. *Deficiency*—Excessive love of Variety; Lack of Patience and Application.

7. *Very Large.*—You have great application, and fix the mind upon objects slowly; cannot leave them unfinished, and lack intensity or point; are apt to be tedious and prolix; are thorough in a few things rather than an amateur in many. All sudden changes are distasteful to you, and there is a tendency to a monotonous sameness in everything you do.

6. *Large*—You have the ability to apply the mind closely, and a capacity for following out a train of thought, and concentrating all your faculties upon one subject; are noted for thoroughness in your studies, and in working out the details of any plan that you have to execute. You are sometimes absent-minded and long-winded, and should guard yourself against becoming tedious or prolix, and also curtail your stories as much as possible.

5. *Full*—You are disposed to attend to but one thing at once, yet can turn rapidly from one thing to another without much disadvantage; are tolerably thorough and patient, and have the ability to follow out a subject in all its details, but are not inclined to be tedious or long-winded.

4, *Average.*—You possess fair power to concentrate your thoughts upon one thing, and dwell upon it till fully completed, or you can easily divert your attention to other matters, and are somewhat pointed in your remarks.

3. *Moderate.*—You are rather lacking in application, and are likely to commence many things that you never finish; lack connectedness and patience, and should aim at more fixedness of mind and steadiness of character.

2. *Small.*—You are inclined to begin a great many things and finish but few; fly rapidly from one thing to another, and are given to perpetual change; are composed of gusts and countergusts of passion; have too many irons in the fire at once, and no one knows how to depend upon you, because so changeable and fickle.

1. *Very Small.*—You are restless, uneasy, impatient, and satisfied only with constant change.

To cultivate —Apply yourself closely and diligently to one thing at once, and be thorough in whatever you undertake; never allow your thoughts to wander, and do not indulge diversity or variety in anything

To restrain.—Seek variety, and be less prolix; change your mental operations rapidly; take constant notice of new things, and cultivate love of novelty.

SELFISH PROPENSITIES.

VITATIVENESS.

Tenacity of Life; Love of Existence. *Excess*—Dread of Death. *Deficiency*—Desire for Death.

7. *Very large.*—You have a strong hold upon life; resist disease with the utmost determination, and will die at last only with a protracted struggle; you feel you cannot give up existence.

6. *Large.*—You love and cling tenaciously to existence for its own sake. You will not be likely to die before your time, unless by accident; but should learn to have less fear of death through faith in the life to come.

5. *Full.*—Your desire to live is strong, but you are not disposed extravagantly to cling to it, and will yield to death. though rather reluctantly.

4. *Average.*—Are strongly attached to life, and will cling to it with a fair degree of earnestness, but have no great dread of death.

3. *Moderate.*—Your hold of life is not very strong; you care comparatively little for existence for its own sake, but like to live on account of family or friends, or with a view to do good in the world.

2. *Small.*—You possess very little power to resist disease, and care very little for life.

1. *Very small.*—You value existence only as an opportunity to gratify the other faculties.

To cultivate.—Set as high a value upon your own existence as possible, and think more of the value of life; seek out every means to add to your mental, moral, and physical enjoyment.

To restrain.—Try to regard death as a natural institution; cultivate a higher spiritual feeling, and have faith in a better life to come.

COMBATIVENESS.

Courage; Defence; Defiance; Pluck; Boldness; Resolution; Self-Protection. *Excess*—Fault-Finding; Contentiousness; Quarrelsomeness. *Deficiency*—Lack of Spirit and Force of Character; Cowardice.

7. *Very large.*—You are very courageous and fond of opposition; prone to dispute, and have a contrary disposition; are ready to grapple with anything or fight against any odds, and very few difficulties can discourage or baffle you. Are very fond of daring exploits, hazardous enterprises, and have more valour than discretion; prefer a rough and daring life—one of struggles and hair-breadth escapes—to a quiet, monotonous business; with small cautiousness, are often foolhardy, and always in hot water.

6. *Large.*—You are resolute and courageous, spirited, and efficient as an opponent; fond of argument, and with large Approbativeness quick to resent an insult; are energetic in carrying out your plans, and always ready to resist any encroachment on your rights; are high tempered, fond of opposition, and should guard against allowing your spirit to overcome your better judgment.

5. *Full.*—You are not lacking in courage, energy or relish for argument; neither are you contentious or quarrelsome, but are disposed to maintain the right and oppose the wrong, according to the dictates of your conscience.

4. *Average.*—You possess a fair amount of courage, yet are not bold in defence, but are somewhat forcible when thoroughly roused; you prefer a peaceable, quiet life to one of daring enterprise.

3. *Moderate.*—You rather lack efficiency, and are too little disposed to assert and maintain your rights; are apt to shrink from argument and contention, and show too little resentment when your rights are infringed. You are adapted for some quiet occupation where business comes in of itself, for you are too irresolute and inoffensive to intrude unbidden upon the attention of others.

2. *Small.*—Are feeble in resistance, cowardly in disposition, and unfit for coming in rude contact with the world ; are too gentle, and cannot say " No."

1. *Very small.*—You are chicken-hearted, and destitute of courage and energy.

To cultivate.—Encourage a bold, resistant, self-defending spirit ; attend some debating society, and take sides in everything : be sure that you are on the right side, and never give up [until] you have defeated your opponent ; encourage rather than shrink from encounter, and do not be afraid of opposition.

To restrain.—Avoid opposition, and turn your back upon discussions and conflicts of opinion ; never swear, or scold, or threaten anybody, and avoid all scenes and places where temptations to quarrel and fight would be likely to assail you.

DESTRUCTIVENESS.

Executiveness ; Energy ; Severity ; Hardness of Mind ; Power to Endure. *Excess.*—Cruelty ; Malice ; Revenge : Extermination. *Deficiency*—Lack of Endurance ; Inefficiency.

7. *Very large.*—You possess that determination, energy, force, and executiveness which removes or destroys whatever impedes progression ; are exceedingly resolute, and capable of doing two days' work in one ; experience the most powerful indignation, amounting even to rage and violence, when thoroughly provoked ; take pleasure in destroying and exterminating whatever seems to be inimical to your wishes ; your powerful executiveness must be kept strictly under the control of reason and moral principle, or it may

at times manifest itself in acts of violence, cruelty, revenge, and hatred.

6. *Large.*—When angry you are inclined to be very bitter, severe, cutting, and disposed to subdue or destroy the cause of your displeasure; take pleasure in breaking, pulling down, and uprooting; could assist in cutting off an arm or leg without faltering, and could withstand much pain and suffering without flinching.

5. *Full.*—You are somewhat forcible, determined, and energetic, but are loath to cause or witness pain or death; your anger is more likely to expend itself in sarcasm and bitter invectives than in acts of violence.

4. *Average.*—You are not really deficient in executiveness and propelling power, yet have none too much, and lack that force which removes obstacles or impediments.

3. *Moderate.*—You are deficient in force and executive power; your anger is not deep, and you threaten more than you execute; you shrink from pain, and inflict it upon others very reluctantly.

2. *Small.*—You are too tender-hearted and possess too tender a soul to enjoy the world as it is, or to endure hardships or bad treatment; are very deficient in energy, and need hardness and force.

1. *Very small.*—Are unable to cause or endure pain, or witness death.

To cultivate.—Never allow an obstacle to turn you aside; engage in field sports, the breaking up of land, the extirpation of weeds; witness butcherings and scenes of physical suffering; fight against public evils, and exercise your energy in striving to remove or destroy whatever impedes progression.

To restrain.—Avoid everything that has a tendency to provoke you, and cultivate a mild and forgiving spirit; never indulge revengeful thoughts or desires, or aggravate yourself by brooding over wrongs; never tease children or scourge animals, but be kind to both; take but little animal food, and *no* alcoholic liquors.

ALIMENTIVENESS.

Relish for Food; Sense of Hunger and Thirst. *Excess*—Gluttony; Drunkenness. *Deficiency*—Indifference to Alimentation.

7. *Very large.*—Have great pleasure in eating and drinking, and often eat too much; find it difficult to control your appetite, hence liable to dyspepsia; you would feel better by going without an occasional meal, and should restore your digestive powers by eating less.

6. *Large.*—Your appetite is generally excellent; are a good liver; set high value upon table enjoyments and solid hearty foods; you should guard against over-eating and drinking, and take sufficient only to recruit the waste of your system.

5. *Full.*—You have a good appetite, yet can easily govern it; rarely over-eat, except when the stomach is disordered; can eat heartily of whatever is set before you, and are not fastidious in eating or drinking.

4. *Average.*—Enjoy food well, but eat more from a sense of duty and from hunger, than to please taste.

3. *Moderate.*—You are inclined to be dainty; but rarely eat with a relish, and are very particular in regard to the quality and preparation of your food.

2. *Small.*—Have so little appetite that it needs cultivating.

1. *Very small.*—You have little or no appetite, and do not eat enough to sustain life.

To cultivate.—Live on a mixed diet ; keep a good cook ; never over eat ; exercise much ; seek out-door employment ; make your table and its belongings as attractive as possible, and then sit down with a determination to enjoy your food.

To restrain.—Avoid highly-seasoned food ; eat slowly, leisurely, quietly, and pleasurably ; mingle pleasant conversation with meals ; always leave the table with a good appetite ; avoid rich food, beer, porter, and all fermented or spirituous liquors, and only partake of one or two dishes at a meal.

ACQUISITIVENESS.

Desire to Acquire or Accumulate ; Economy ; to Trade ; to Hoard and Possess. *Excess*—Grasping, Miserly, and Avaricious Tendencies.—*Deficiency*—Prodigality ; Waste.

7. *Very large.*—You are too eager after wealth, too industrious, too close in making bargains, and disposed to make money your idol ; are close-fisted, penurious, and miserly. You should keep this faculty in subjection to conscientiousness, lest your sordid desire for wealth should render you somewhat dishonest.

6. *Large.*—Have strong desire to acquire property, also the disposition and ability to turn everything to a good account ; are industrious, economical, and close, and make the most of everything ; with large Benevolence,

will spend freely where your sympathies are enlisted ; but with large Cautiousness, are careful *not* to bestow your charity on the undeserving.

5. *Full.*—Will work hard for property and take good care of what you get, but are not avaricious or miserly ; are ready to help friends, but not willing to impoverish yourself by giving away too much.

4. *Average.*—You will earn property to use, but not to hoard, and are likely to keep yourself poor by living up to your income.

3. *Moderate.*—You find it more difficult to keep, than to make money, and will value it merely as a means, not as an end, are apt to disregard small expenses, and are likely to spend as fast as you earn. You ought not to engage in any speculative enterprise, in money collecting, nor in financial affairs.

2. *Small.*—You hold your money too loosely, and spend it without getting its value ; are liable to contract habits of extravagance, and to live beyond your means.

1. *Very small.*—You are wasteful, extravagant, and idle, and have no idea of the value of money.

To cultivate.—Keep a strict account of expenditure,—especially personal expenses, and balance your cash accounts frequently ; be frugal, cultivate industry, save the littles, and earn what you can.

To restrain.—Often quit business for recreation ; think less of pounds, shillings, and pence, and study means for enjoying your property ; be generous and strive to make others happy, and remember, that you cannot take your gains into another world.

SECRETIVENESS.

Policy; Reserve; Evasion; Management; Concealment. *Excess*—Duplicity; Cunning; Deception. *Deficiency*—Bluntness; Want of Tact; Open-mindedness.

7. *Very large.*—You are non-committal and cunning in the extreme; seldom appear what you are, or say what you mean; you are reserved, politic, guarded, shrewd, and artful; given to double dealing; enigmatical and mysterious, so much so that your most intimate friends are never sure that they really understand or know you; with small Conscientiousness, you would be tricky, deceptive, and untrustworthy.

6 *Large.*—You are reserved in the expression of your sentiments, and appear to aim at one thing while accomplishing another; have tact and power to conceal your thoughts and actions; are fond of surprising your friends; inclined to practice strategy, and prefer indirect approaches to a straightforward course, and may often resort to cunnning devices to accomplish your purposes. With large Conscientiousness, will not tell a lie, but are rather disposed to evade the direct question; your character and intentions are so carefully covered up as to subject yourself to suspicion; you should try to be more open-minded.

5. *Full.*—You evince much self-government; can keep a secret, and conceal your emotions if necessary, yet are not disposed to be cunning, sly, or hypocritical.

4. *Average.*—You are neither artful, nor very frank, still you are more out-spoken than reserved, and when your feelings are excited you are liable to give your emotions full expression.

3. *Moderate.*—You are candid, open-hearted, frank, and dislike concealment or underhand measures, and generally express your thoughts and emotions in a clear, unequivocal manner; your friends know just what you are, for they see both your virtues and your faults; a little more reserve and self-government would improve you.

2. *Small.*—You are open and transparent; speak just what you think; act as you feel; cannot keep any secrets; are too plain-spoken and candid.

1. *Very small.*—You possess no power for concealment, and are disposed to tell more than you know.

To cultivate.—Endeavour to keep your impulses in check by cautiousness and reason, and remember that everybody is not to be trusted; do not confide too much in people, and subject all you say and do to judgment, and endeavour to suppress injudicious outgushing of feeling.

To restrain.—Be more frank and out-spoken, and never equivocate; cultivate sincerity and straightforwardness of purpose.

From the foregoing pages the reader will perceive that a phrenological organ can be very weak and small, or strong and large. The phrenologist is able to ascertain the size and activity of an organ, and to advise accordingly.

THE BRAIN, & ITS FUNCTIONS.

HEAD MEASUREMENTS.

(*The Scotsman*, December 5th, 1881.)

The brain is universally recognised as the organ of mind, and the size of this organ is very generally taken as an index of mental capacity. Big brains have come to be suggestive of great minds, while it is an undoubted fact that the possession of a brain which falls below a certain minimum standard of weight implies idiocy on the part of its unfortunate possessor. M. Broca places the lowest limit of brain-weight compatible with human intelligence at 37 oz. in males, and 32 in females, the average brain-weight in Europeans being about 49 oz. Whether the possession of more than the average quantity of brain implies the presence of more than average intelligence is a question that has given rise to much discussion. It is an undoubted fact that very high brain-weights are occasionally found in people whose mental acquirements are certainly not above the average. Out of 157 brain-weights of adult Scotsmen, Dr. Peacock found that four, all belonging to artisans, who, so far as could be learned, had not been distinguished above their fellows by superior intellectual endowment, weighed over 60 oz. each, while the heaviest brain on record—it weighed 67 oz.—belonged to a bricklayer. Dr. Morris, who chronicled the case, was told that the man "had a good memory, and was fond of politics; but that he could neither read nor write." Whatever his potentialities might have been, "it is evident," says Dr. Morris, "that his actual acquirements were not great." The non-development of superior mental power in such cases may, however, be attributable not to lack of capacity for learning, but to the absence of the conditions necessary to its growth. Certain it is that among the educated and intelligent classes the number of big brains is greater than with uneducated and less intelligent people. Among the latter, the proportion of brain-weights above 55 oz. has been ascertained to be only from 4 to 6 per cent., while the proportion among men who have been distinguished for great intellectual acquirement is at least 23 per cent. The brain-weights of only 23 such men are accurately known, and it is from these that the above proportion has been obtained. With few exceptions these were all above the average capacity of 49 oz. First, in this respect, comes the celebrated naturalist, Cuvier, with a brain-weight of 64½ oz., followed by the famous Scottish physician, Abercromby, and the poet Schiller, each with 63. Goodsir, the anatomist, follows at a considerable distance with 57½; Sir James Simpson with 54; and Chalmers with 53. That such men as Gladstone, Bright, etc., possess more than average brain-weight may be inferred from a statement lately made public of the size of hat worn by these and a number of other living or recently deceased statesmen and literateurs. Premising that what is known to the trade as size 7 is that of the average head, with presumably 49 oz. of brain, and that 7⅜ is a size so large as only to be made when specially ordered, it appears that out of fourteen persons whose hat sizes are given, two (Lord Chelmsford and Dean Stanley) were below, while other two (Lord Beaconsfield and the Prince of Wales) were exactly up to the average. Of the others, Dickens, Selborne, and Bright required 7⅓, Earl Russell, 7¼; Lord Macaulay, Gladstone, and Thackeray, 7⅜; Louis Phillippe, 7¾; and the Archbishop of York, 8 full! Of the twenty-three distinguished men already referred to whose actual brain-weights are known, four—including the late Professor Hughes Bennet, and Hermann, the philologist—were distinctly below the average, showing, as Dr. Bastian points out in a recent work, that "a well-constituted brain of small dimensions may be capable of doing much better work than many a larger organ whose internal constitution is, from one cause or other, defective." When there is no such defect, however, the big brain, there is every reason to believe, confers an undoubted advantage on its owner.

Such being the case, it is not surprising that the assertion recently made, that a sensible diminution has taken place of late years in the size of the heads of the male population of those islands, and consequently of the brains—for in health the brain always fills the skull—should have attracted attention. The data upon which this startling statement is founded have been supplied by the most persistent, if not the most scientific, class of head measurers—the hatters, whose evidence on the point is of the most circumstantial kind. One merchant, of large experience, states that of the six sizes of hats, beginning at 21 inches and increasing by one half inch to 23½ inches, he was in the habit, five and thirty years ago, of buying for his retail trade in the following ratio, beginning at 21 inches, viz: 0, 1, 2, 4, 3, 1, while at the present time he is selling hats in the following ratio, viz: 3, 4, 3, 1, 1, 0. In other words, where only one hat was required, thirty-five years ago, at or under 21½ inches, he now requires seven; and where formerly four of the two largest sizes were required, he now only needs one.

From numerous letters which have appeared in *Nature*, the experience in this instance would appear to be that of the trade generally. One manufacturer writes—"I should say that heads generally are two sizes less than at the time (thirty to forty years ago) you refer to; a head of more than 24 inches circumference is now quite a rarity, whilst we make thousands of hats for heads with a circumference of about 21 inches." The decrease, according to another manufacturer, is so general "that we do not make big sized hats for stock, but only as ordered, and very few then." That a similar diminution has taken place in Scotland is the experience of one of the principal hatters in Glasgow. There can be no reasonable doubt, therefore, that our hats are, on the whole, smaller than they were a generation ago. Do smaller hats, however, in this case imply diminished heads? It has been pointed out that the undoubted diminution is probably to be explained by a reference to change of fashion in the mode of wearing both hat and hair. Thirty years ago it was customary, as the prints of the time show, to wear the hat drawn well down over the head, how far over may be judged from the fact that it was customary, in England at least, to attach a piece of cloth to the under side of the brim, at the back, in order to take the friction off the coat collar. On the other hand, the hair was worn thick and long, the present style of close-cropped hair being in those days associated with soldiers and prisoners. These two causes together seem fairly adequate to explain such decrease in the size of hats as has been noticed. If inadequate, as certain correspondents in *Nature* maintain, the only alternative is to believe that, in the course of little more than a quarter of a century, the heads, and consequently the brains, of our male population have sensibly diminished. That this is in the last degree improbable will be the opinion of every student of recent anthropological science.

In a progressive civilisation such as prevails in this country and throughout the greater part of Europe and America, there is reason to believe that the cranial capacity of the population is, on the whole, increasing rather than diminishing. Owing to the want of early observation, it is difficult to institute comparisons between past and present. An opportunity, however, lately occurred in Paris which was taken advantage of by M. Broca. In digging the foundation of a new building a vault was opened containing a large number of human skeletons, whose surroundings proved them to have lived not later than the twelfth century. M. Broca found the average capacity of 115 of those twelfth century skulls to be 1426 cubic centimeters ; while another series of skulls —125 in number—taken from a cemetery belonging to the early years of the present century, gave an average of 36 cubic centimeters more. The average Parisian skull would thus seem to have increased considerably in capacity during seven centuries of progressive civilisation. That this increase has gone on slowly but surely as man progressed from barbarism to civilisation may be inferred from a study of the cranial capacities of the various human races. Thus, while the brain capacity of the European amounts to 94 cubic inches, it is only 91 in the Esquimaux, 85 in the negro, 82 in the Australian, and 77 in the Bushman. These are merely averages, and, as such, do not bring out the important fact lately noticed by Le Bon, that among the lower races the limits of variation in the cranial capacity of individuals of the same sex are much less extended than in the higher races. Thus, among modern Parisians large and small skulls vary by about 600 cubic centimeters, while negro skulls vary only by 204, and ancient Egyptian by 353 cubic centimeters. Another important difference in the cranial capacity of the higher and lower races is connected with sex, and serves to throw light upon the influence of mental exercise in increasing brain capacity. According to Professor Bischoff, of Munich, in a recently-published work, the difference between the average brain-weight of men and women is 10½ per cent. Much of this is undoubtedly due to difference in stature, a tall person having, *cæteris paribus*, a larger brain than one less in height; partly, however, it is attributable, there can be little doubt, to inferior mental training. Among the lower races, where the women have not only charge of the offspring, but have also to share, and that largely, in the husband's occupations, the brain capacity of the two sexes shows much less difference. The difference, according to Le Bon, between the average capacity of the skulls of male and female Parisians is almost double that found to obtain between the skulls of the male and female inhabitants of Ancient Egypt. Civilisation, by giving increased exercise, especially to the male brain, has, there is good reason to believe, gradually produced that increase of brain capacity which now distinguishes the civilized from the savage races of mankind. Nowhere has this influence been more conspicuous than in China, whose culture, if not of the most advanced kind, has the advantage over all others in the geat length of time it has endured. The Chinese are, as might have been expected, a big-brained people; indeed, the only statistics of Chinese brain-weights available show them to exceed all other nations in this respect. A few years ago the brain-weights of 11 adult male and of 5 female Chinese—the chance victims of a great typhoon at Hong-Kong—were obtained. These belong, with one exception, to the coolie or lowest grade of Chinese society, yet the average brain-weight of the males reached 50½ oz., and that of the females 45½ oz. This is an average not attained, so far as yet known, by any other nation, it being fully 6 oz. above that of the average negro, 1½ oz. above the European, and ½ oz. above the average Scotsman. That civilisation has been the main cause of increase in the size of the brain there can be little doubt. To admit, therefore, that the heads of the British people are now growing smaller, would be to confess that the resources of civilisation were indeed exhausted, and that, as a people, we had begun a retrograde journey towards the barbarism from which we originally emerged.

DR. J. BATTY TUKE says:—Starting on the assumption that you are entirely unacquainted with the anatomy of the brain, and that your knowledge of its functions is confined to a general abstract belief that it is the organ of the mind, I felt it would be only talking round the subject if I did not, in the first instance, present to you some of the leading facts connected with its structure and functions. This, then, is not to be, strictly speaking, a Health Lecture ; it is to afford a basis for a discourse on Brain Health, which I hope to deliver to you on a future occasion, should what I lay before you to-night be found to possess such intrinsic interest as to induce you to return. I must beg your indulgence in dealing with a very large, intricate, and difficult subject ; I can only hope to produce to you a very few of the most important facts. Had I to deliver six, instead of one lecture on the subject of the brain, my task would be comparatively easy—but if I can convey to you, within the next sixty or eighty minutes, some knowledge which you do not at present possess about this magnificent organ, my object will be gained.

Distributed throughout the whole system, pervading every tissue, except bone and gristle, there is a system of thread-like organs called nerves. In the skin and muscles, the nerves are in the form of small fibrils of a white colour. As we trace them upwards, we find these fibres coming together, forming bundles which grow larger and larger, as bundle joins bundle, until they form great nerve trunks, which pass into the spinal cord. The function of these nerves is to convey impressions *to* the spinal cord and the brain, and to convey *from* the brain and spinal cord the stimulus generated in those organs productive of motion. As I must circumscribe my subject it will be necessary to confine ourselves almost exclusively to this class of nerves, leaving almost unheeded the nerves of special sense, *i e.*, those of the nose, eye, ear and tongue, and also to leave unmentioned those related to the great internal organs. Although we will thus be shut off from many questions of deep interest we will have little enough time to devote to the consideration of the connection of the spinal nerves with the brain and to the arrangement of the tissue of that organ and of the spinal cord.

The brain and spinal cord is composed of nerve fibre nerve cells, connective tissue, and blood vessels. Their substance is a soft semi-fluid mass, the brain, for instance, contains 75 per cent. of water, only 25 per cent. being animal matter. In the spinal cord there is less water. The spinal cord is contained in the canal of the backbone ; the brain in the great cavity of the skull called the *cranium*, or brain case. The spinal cord gives off for the supply of the trunk and extremities thirty-one pairs of nerves, which pass out by as many holes in the backbone, and those from the brain, with the exception of those going to the eyes and nose, emerge from the skull at its base by similar perforations. Notwithstanding these holes and the great hole for the passage of the spinal cord, the brain case is hermetically sealed by muscles and other textures, so that no ordinary impulse from without can have any influence on its contents. Let me illustrate this. When I fill a glass jar with water, and inverting it under water, raise it above the surface, the water does not descend, the glass jar remains full ; water may be forced out by the introduction of any body, but when that body is removed water returns. This represents the condition of the contents of the skull, which, whatever may be their difference in quality, must always remain the same in quantity. The bearings of this remark will be seen further on.

Each nerve is, as I have already said, composed of bundles of fibres, and each fibre is composed as follows,—first, internally, a delicate thread, called the *axis cylinder*, which is believed to be the medium through which impressions are conveyed to and from the nervous centres. This is surrounded by a white substance named, after its discoverer, the *white substance of Schwann* ; and externally, a fine membrane of connective tissue, which is simply for the protection of the inner tissues.* Now, mark how closely the structure of a nerve resembles that of a submarine telegraph cable. A telegraph cable, as you see, is composed of a core, the copper wire which, as you know, conducts the magnetic current,—this corresponds to the axis cylinder ; second, a layer of gutta-percha, for the purpose of insulating the wire, that is to say, for preventing the access of any body which might divert the current,—this corresponds to the white substance of Schwann ; and third, a parcelling of yarn for the purpose of protecting the gutta-percha,—this corresponds to the fibrous protective membrane. There is, however, a difference between the nerve fibres outside and those inside the back-bone and skull ; the latter are not invested with the fine external fibrous membrane. They are protected by a connective tissue peculiar to the spinal cord and brain. This connective tissue, termed *Neuroglia*, or nerve-glue, is difficult to explain to a non-professional audience. It is an extremely delicate reticulated net-work of fibres pervading the whole organ. When I say you can figure it best to yourselves by supposing that this mass of tow represents a portion of brain connective tissue, (nerve-glue is a bad term, as it conveys the idea of an adhesive substance), and that these wires represent the nerve fibres and these tubes the blood-vessels supported by it, you must remember that it is a tissue so fine and delicate that it can only be seen by the use of a very powerful microscope. I may best illustrate the coarseness of my illustration by saying that, were this tow and these wires a piece of an actual brain, the brain itself would be at least the size of the Castle rock. The nerve fibres of the brain and spinal cord are very delicate, varying in diameter from $\frac{1}{1400}$th to $\frac{1}{12000}$th of an inch, and, of course, are utterly inappreciable by the unassisted vision. There remains the nerve cells to be described—these are the most important organs of the nervous system ; but I think it will be better to delay their consideration until I have described more fully the general anatomy of the brain and spinal cord.

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* Connective tissue is applied to the structures which simply bind together the component parts of the various organs, and serve as a support for delicate tissues.

The spinal cord is from fifteen to eighteen inches long ; it is divided into two equal lateral halves by two fissures which nearly meet ; it communicates with the brain through the great hole at the base of the skull. Throughout its whole length nerve fibres extend, but their arrangement is different in the front and the back portions of the organ. In the back portion of each half, or posterior columns as they are termed, as each nerve enters the cord a considerable number of its strands cross over to the opposite side and run upwards to the brain. The function of this part of the cord is to carry *to* the brain sensations generated in those parts in which the nerves are distributed, or to use the convenient scientific term, from the periphery. In the front, or anterior columns, the fibres pass upwards on the side they enter, and do not cross till they reach the medulla oblongata, the organ which connects the spinal cord with the brain. Their function is to carry messages *from* the brain to the periphery. The posterior or sensory nerves, and the anterior or motor nerves, are separate for some short distance after leaving the cord; but they then join and pass out from the backbone as one nerve, which has the power of transmitting messages upward and sending messages downwards.

I think I have said enough in the meantime about the anatomy of the nervous system to allow me to proceed to the description of the brain, which is its great dominant organ. The model I hold in my hand represents the organ exposed by removal of the skull—you see it looks as if enveloped by a bladder—this membrane is called the *dura mater* or tough protector; immediately below this is a very fine membrane called the *arachnoid*, its extreme delicacy suggesting a spider's web; and next to the brain itself is another fine membrane called the *pia mater* or soft protector, which invests it very intimately. All these membranes pass through the great hole at the base of the skull to envelop the spinal cord. This second model represents the brain divested of all its coverings except the internal one, and this third one a brain perfectly exposed. In this condition its average weight in man is nearly 3 lbs., in woman some ounces less ; this difference is not to be explained by the smaller stature and bulk of women, for it has been shown that whereas the brain weight is nearly 10 per cent. less in woman than in man, the stature is only 8 per cent. less. It was supposed by Sir William Hamilton and others that the brain reached its full development as to size at the age of seven, but this idea is now entirely abandoned, and it is generally held that it does not reach its maximum weight till the twentieth year. It is true that in boys it arrives at fully $\frac{5}{6}$ths of its weight by the seventh year, and in girls $\frac{11}{12}$ths which may, to some extent, account for the greater precocity of the latter, but the change which goes on in its constituents during the development of the remaining $\frac{1}{6}$th and $\frac{1}{12}$th, between the years of seven and twenty, are of a most important character. I had intended to speak of the statements lately made in certain journals as to the alleged diminution in size of the head within the last fifty years, but the fallacy of those statements was so thoroughly exposed in last Monday's *Scotsman* that I deem it unnecessary to reiterate the arguments. I consider this article of so much importance that I purpose republishing it with this lecture.

The great anatomical divisions of the brain are not difficult to demonstrate. As I hold the model in my hand with its upper surface exposed to your view, you see a great mass of twisted and apparently irregularly arranged matter of a greyish pink colour, and when we examine the base of the organ we see the same type of arrangement existing there, except at the lower and back part of it, where we have a striped double mass. The upper twisted convoluted organ is the *cerebrum*—the great brain—*the* brain, and the inferior small striped organ is the *cerebellum* or little brain. You will notice a long mass projecting in front of the cerebellum, this is the *medulla oblongata* or oblong marrow (oblong in contradistinction to the long round spinal marrow); it is continuous with the spinal cord; and in front of it a transversely striped mass, called the *pons Varolii*, or Bridge of Varolius. I shall avoid technicalities as far as I am able, but for our mutual convenience I must ask you to remember the four terms—*cerebrum*, *cerebellum*, *medulla oblongata*, and *pons Varolii*. When I remove the three latter organs you will see at a glance how thoroughly the great brain deserves its name; it is with this organ, the cerebrum, that I have mainly to do to-night.

The cerebrum is divided into two equal halves by a great fissure called the *great longitudinal* fissure; these halves are called the *hemispheres* of the brain. These are made up of apparently complicated structures, convoluted worm-like organs which twist and turn over its entire surface. But in point of fact the arrangement of these organs, which are called the *convolutions*, is pretty definite, and the anatomist has by careful study been able to arrange them into divisions or *lobes*, and to assign to each convolution a separate name. Moreover, the physiologist and pathologist have noted phenomena which point to different functions being localised in certain areas.

I will not go further at present into the nomenclature of the divisions of the brain than to state to you that the anatomist speaks of the *anterior*, the *middle*, the *posterior*, and the *tempero-sphenoidal* lobes.

The convolutions dip deeply into the substance of the organ;—this you cannot see in a model, but if you look at this brain which has been hardened in spirit, you will notice that they form deep furrows. On the depth of these furrows, and on the tortuosity and complexity of the convolutions is believed to depend, to a very great extent, the potentiality of high intellectual development; for in the brains of the inferior races of mankind the convolution have been found very simple and shallow, whilst in those of distinguished men they have been generally observed deep and complex; and as we watch the scale of intelligence in the lower animals we find complexity of brain arrangement as we ascend. The purpose of the convolutions seems to be the extension of superficies on which to extend the more active structure of the brain, viz., the grey matter.

When we slice off a portion of the brain and expose its interior we notice a very distinct and definite difference in the appearance of its structure. There is a great central mass of a glistening white substance which bordered all round by a layer of pinky grey matter which dips into the fissures and into all the furrows between the convolutions—it is about ½ an inch in thickness. The difference in colour between these two matters is due first, to the much richer supply of blood to the grey than to the white matter; and second, to the presence in the grey matter of those most important bodies the *brain cells.* Both matters are composed of blood vessels, neuroglia, and nerve fibre, but *nerve cells exist only in the grey matter.* These bodies which are found in incalculable numbers, probably in hundreds of thousands, vary in size, but the largest of them is invisible to the naked eye, they consist of finely granular protoplasm, *i.e.*, the simplest form of matter known to science ; they vary somewhat in shape, those of the brain being mostly globular or pear shaped, appearing triangular when cut through lengthwise ; those in the spinal cord being irregular in shape, presenting this appearance under the microscope. Each contains a *nucleus* or kernel, which again contains a *nucleolus* or little kernel. They are arranged in layers of from four to six in number and are supported in position by the neuroglia. I have twice used the adjective " most important " when speaking of these bodies ; and, for this reason, we have the best reasons for believing that they are the organs through which impressions from without are appreciated, that through their vital properties we see, taste, hear, smell, and feel, and that in them is generated and stored up what we, in our ignorance, term nerve force, and from them is discharged what we, in our ignorance, term nerve energy. For the purpose of immediate illustration let me adduce three experiments in confirmation of these statements—(1) When we irritate the surface of the skin a sensation of pain is produced which is referred to the part injured, but which really exists in the brain ; for if we cut off the nerve connection between the part and the brain, no sensation is experienced, however much the part may be irritated. The brain is therefore a perceptive centre. (2) When we *will* to move a limb, under ordinary circumstances the limb obeys the stimulus of the will, and movement ensues ; but if we destroy any part of the nervous apparatus connecting the brain and the limb, no effort of will can produce action. The brain is therefore the organ of volition. In the first instance the results of irritation cannot be carried *up* to the brain, and in the second the stimulus of the will cannot be carried *down* to the limb ; (3) When the grey matter of the convolutions is removed or injured by extensive diseases the subject of experiment becomes more and more dull and stupid, until at last all indications of perception and volition disappear. Comparing it to an electric telegraph whose apparatus is at fault, in the first experiment the indicating needle is useless ; in the second the manipulator may work the handles as energetically as he will, but without result, in both instances because the connecting wires are injured ; and in the third experiment the cells of the battery are removed.

Let us now enquire what is the arrangement of the connecting apparatus. As I have shown you, each hemisphere of the brain consists of masses of grey matter and of masses of white matter. The grey matter is arranged in *ganglia*, *i.e.*, aggregations of nerve matter containing nerve cells. These ganglia are two-fold—1st, the grey matter of the convolutions forms two great ganglia called the *great hemispherical ganglia*, covering the whole surface of the organ, and 2nd, in the middle of the brain or rather nearer its base there is a series of such ganglia. The scientific terms applied to these are *optic-thalami* and *corpora stiata ;* but I shall speak of them as the *basal ganglia.* The grey matter of these basal ganglia is in direct anatomical connection with the grey matter of the spinal cord, which differs from that of the cerebrum in that it lies in the centre surrounded by white matter. In the spinal cord the white matter is external. We have already traced the course of the fibres in the cord. Remembering that the function of the anterior fibres is downward and that of the posterior upward, we will, for the purpose of anatomical description, trace them from below upwards. In their course to the brain they are connected with the cells of the grey matter of the cord ; passing through the medulla oblongata and pons Varolii, they run towards the basal ganglia, some of them passing right through, whilst others terminate in the great nerve cells of those organs, and are thus interrupted in their continuity ; but they start afresh to pass on with the uninterrupted fibres in their course to the grey matter of the hemispheres. From the basal ganglia the fibres spread out like a fountain, or like the sparks from a firework—they radiate, or are projected towards the dome of grey matter, and are in consequence termed the *corna radiata*—the radiated crown, the *projection series* of fibres. By this means we have direct communication established between the furthest extremities of a nerve and the hemispherical ganglia. An ounce of demonstration is worth a pound of description in dealing with such a difficult subject, and I do not think I would have ventured to speak about it were it not that I had it in my power to lay the actual thing before your eyes. This I am enabled to do by the kindness of Dr. Hamilton, Pathologist to our Royal Infirmary. This large slide contains a very thin section or slice of a human brain. By a marvellously ingenious process devised by himself, Dr. Hamilton is able to cut a slice so thin as to permit of the passage of light, and therefore to cast on a screen the images of its various structures. What I am about to show you is a slice made through the entire substance of the organ as nearly as possible in the middle line from before backwards.

But you will ask how does fibre communicate with cell. Looking at the model of a cell we see that it has various filaments projecting from it; these are called the *Poles*. Cells are termed *unipolar*, and *multipolar*, acording as they possess one or two or many projections. The poles at the base are termed *basal*, those at the apex *apical*, and those starting from the slides *protoplasmic*. Now the basal pole is continuous with the axis cylinder of the nerve fibre, which I told you is the medium through which impressions are conveyed in the nerves. According to certain authorities the poles at the apex are continuous with a horizontal series of fibres on the surface of the convolutions, and it is also believed that cell communicates with cell by means of the protoplasmic poles.

So much for the connection of the brain with the rest of the nervous system; but we must revert to the models again for a few minutes to show another important connection, that between the two hemispheres. Every part of the nervous system is double: there is a right and left cerebrum, cerebellum, medulla oblongata, and spinal cord, and each of these lateral halves is in direct communication with the other. The nervous centres are double organs, and are associated together by nerve-fibres. I ask you to accept this statement as far as it concerns the other organs, but I am able to demonstrate it to you in the case of the brain by another of Dr. Hamilton's wonderful sections. Deep as the great longitudinal fissure is, it does not cut the cerebrum entirely in two. At the bottom of the cleft there is a mass of transverse fibres called the *corpus callosum*, or hard body. This is the most important commissure of the brain. The derivation of the word commissure, *committo*, to bring together, indicates its function. Through it pass nerve-fibres which can be traced from the grey matter of each hemisphere, bending in the form of an arch (and therefore termed *arcuate* fibres), to the corpus callosum, passing through which, they course to the grey matter of the hemisphere opposite to that they start from, and reach it at an exactly corresponding spot—identical portions of each hemisphere are thus connected.

Thus we have, by means of nerve-fibre, a perfect system of association—by the radiating fibres the spinal cord is in direct connection with the cells of the grey matter of the brain, and by the arcuate system the cells of opposite hemispheres are brought into intimate relation one with the other.

I will now direct your attention to the blood-supply of the brain. From its constant activity, the brain demands a large amount of blood to nourish and restore its elements. In point of fact, nearly 6 per cent. of the total blood is at work in the brain: and if we consider that about 64 per cent. of the blood is circulating in the heart and large vessels, and only some 36 per cent. in the tissues of the body, we gain an idea of how richly the brain is supplied. Time will not permit of me going into the interesting subject of the arrangement of the brain blood-vessels. Suffice it to say that it is devised with the objects first of insuring not only a very copious supply, but also a very uniform and equal flow of the nutrient fluid, and secondly, of protecting it, as far as possible, from influences from without. The results of the stoppage of a cerebral vessel are most disastrous—the functions of the part supplied are at once arrested, and unless the obstruction is removed the tissues become permanently disorganised. The convolutions are nourished by vessels which enter from their outer surface, certain of which pass on to the white matter. But the blood-supply is five times greater to the grey than to the white matter, an additional evidence, if such were necessary, that the former exercises much more functional activity than the latter.

You will remember that I pointed out to you at the opening of this lecture that the brain is contained in a hermetically sealed cavity of rigid bone, and that the quantity of matter in this cavity must always remain the same. Now, unless some provision exists for differences in the amount of blood in the brain, it follows the amount of blood must remain invariably uniform. And this was for long believed to be the case. But experiments have shown that this is not true, that, although the total amount is pretty uniform, still, under certain circumstances, the quantity of blood varies. This is markedly so in the condition of sleep—it has been reduced to demonstration that during sleep the amount of blood in the brain is diminished. How, then, is compensation procured for the withdrawal of blood, and what material is displaced if a greater quantity than usual is introduced? This compensation is procured by the *cerebro-spinal fluid.* You know the brain contains 75 per cent. of water; under circumstances of blood-pressure, a certain portion of this water becomes rapidly absorbed or displaced, and when blood is withdrawn a portion corresponding in bulk to the abstracted blood is rapidly drawn into the cavity of the skull. "Hence we may consider that the cerebro-spinal fluid in the interior of the skull not only subserves the mechanical functions of fat in other parts as a packing material, but, by the readiness with which it can be displaced, provides the means whereby undue pressure and insufficient supply of blood are equally prevented" (Kirke's Hand-Book of Physiology).

The consideration of the chemistry of the brain will not detain us long, for really not very much is known about it. The nervous tissue contains substances closely allied to albumen, which, as you know, is the chief constituent of the white of egg, a substance which coagulates when mixed with alcohol. But I do not think any physiologist would venture the statement made by a distinguished teetotal lecturer last year in this city, that these albumenous substances contained in the brain become coagulated by the drinking of spirits. Were it true that when alcohol is introduced into the system the albumen of the brain coagulates, the brains of a very large proportion of our countrymen would be in a condition identical with that of hard-boiled eggs; and although the Scot is generally regarded as a hard-headed man, his hard-headedness hardly amounts to this. The lecturer I allude to reduced his statement to demonstration. He placed in a glass vessel a certain quantity of white of egg, which he told his audience was identical with certain substances contained in the brain. He then poured in a glass of whisky which, of course, produced coagulation, and he drew the deduction that the same result obtained in the brain when it was under the influence of alcohol introduced into the system through the stomach. It is a pity that a good cause should be marred by such misrepresentation. Supposing I were an anti-teetotal lecturer I could equally easily, and equally inaccurately, quote chemistry for my purpose in denouncing tea. I should say to you :—" Ladies and Gentlemen,—Dr. Foulis in his lecture last year on the blood told you that it contained a considerable amount of iron. You are in the habit of thinking tea is a harmless beverage, but mark this experiment :—in this jar of water is a small quantity of a solution of iron ;—observe the dreadful results when I add to it a cup of tea—it converts it into ink by virtue of its tannin, and it acts in a similar manner on the blood ! " I beg to assure you, however, that both statements are equally incorrect. Alcohol does not harden the brain, on the contrary, it softens it ; and tea does not convert the blood into ink. I wonder if this lecturer would be surprised to learn that, do what we will, a true alcohol exists in every brain. In the nervous tissues of the most conscientious teetotaler an alcohol called *cholesterin* is to be discovered in considerable quantity. He would probably say that if such is the case there is no reason for adding more, and, unless under exceptional circumstances, I am inclined to agree with him.

With this very rough statement of the anatomy and structure of the brain, we pass on to consider its functions. Certain of these have been already alluded to. I am only going to speak of the functions of the cerebrum, leaving those of the cerebellum and the medulla oblongata either to another occasion or to another lecturer. The functions of the cerebrum are thus summarised by

Kirke :—" (1.) The cerebral hemispheres are the organs by which are perceived those clear and more impressive sensations which can be retained, and regarding which we can judge. (2.) The cerebrum is the organ of the will, in so far at least as each act of the will requires a deliberate, however quick, determination. (3.) It is the means of retaining impressions of sensible things, and reproducing them in subjective sensations and ideas. (4.) It is the medium of all the higher emotions and feelings, and of the faculties of judgment, understanding, memory, reflection, induction, imagination, and the like."—(" Handbook of Physiology," Kirke.) These conclusions have been arrived at (1.) by the observation of the facts of comparative anatomy, which show that as we ascend in the scale of the animal kingdom, with increased development of the brain we have an increase of intelligence, till on reaching man we find the most perfect type of brain. (2) By the careful study of the symptoms of disease of the brain ; and (3) by experimentation. The subject of progressive development is most interesting, but I cannot allude to it further now than to point out the characteristic of the human brain which serves to distinguish it from those of the rest of the animal kingdom. This is that in it only the posterior lobes are so fully developed as to overlap the cerebellum. Even in the higher apes in which the type approaches most nearly to that of man, the back part of the brain is much less perfectly formed, and the cerebellum can be seen when the organ is viewed from above.

But the most definite proof that the cerebral hemispheres are necessary for the production of those phenomena which we term intelligence and will, is based on data procured by the observation of their injury by disease, or by the hand of the physiologist. Everyone knows that a violent blow on the head produces unconsciousness, and that mental function is in abeyance when blood is effused on to or into the brain, producing apoplexy. But these are but coarse experiments, and the physiologist has been obliged, in order to elucidate important facts bearing on the treatment of disease, to submit animals to experiment. He has found by this method that when the grey matter of the superior convolutions is removed, intelligence and voluntary movement are put an end to—that all spontaneous action becomes impossible. A frog, the upper part of whose brain has been removed, continues to breathe, and is even able to move his limbs when irritation is applied to them, through virtue of the functions of the spinal cord and medulla oblongata, which are themselves independent nervous centres—independent to this extent, that they are able to transfer impressions from the posterior or sensory columns, to the anterior or motor columns, without sensation being conveyed upwards to the brain, and yet motion being produced. This is termed *reflex action*. But as I have already stated to you, if the grey matter of the convolutions is destroyed, or if the connection between the brain and the spinal cord is severed, feeling cannot be experienced, and the will becomes inoperative. I do not think it necessary to prolong the argument, as sufficient has been said to enable you to give a reason for your belief, that the possession of a brain is necessary for the manifestation of mental phenomena—that it is in fact the organ of the mind.

THE DIET OF BRAIN WORKERS.

Brain-workers—whether literary, professional, or business men—need the best of food served in the most agreeable manner, and in variety and abundance, and for the following reasons :

1. Labor of the brain exhausts the system more than labor of the muscles. According to the estimates of Prof. Houghton, three hours of hard study produce more important changes of tissue than a whole day of muscular labor.

Whether this statement is mathematically accurate or not, we do certainly know by experience that a few hours of mental labor is more exhausting than a whole day of muscular labor to those who are accustomed to such toil. No literary man can spend as many hours at his work as the day laborer. While the mason, the carpenter, and the haymaker work their 10 hours a day, with only moderate fatigue, the professional man is wearied by three or four hours of severe, consecutive thought. This exhaustion that we feel after hard study is the result and concomitant of the waste of tissue. This waste of tissue is supplied by food.

If the theory of the correlation and conservation of forces be carried to its logical conclusion, it would seem that for every mental act there is a corresponding expenditure of force which bears a direct ratio to the thought evolved, and that unless the proper force is supplied, thought becomes impossible, just as steam is impossible without heat or motion, without some force to produce that motion.

Phosphorus, which is a prominent ingredient of the brain, is deposited in the urine after mental labor, and recent experiments have shown that by the chemical examination of these phosphates deposited, it is possible to determine whether an individual has been chiefly using his brain or his muscles.

That the brain is the organ of mind is now as well established as any fact of science. The brain, being the noblest organ of the body, receives a greater proportional amount of blood than any other part, and is of course correspondingly affected by the quantity and quality of the nutrition. It has been estimated that one-fifth of the blood goes to the brain, though its average weight is not more than fifty ounces, or about one-fortieth of the weight of the body.

2. Brain-workers, as a class, are more active than mechanics or laborers. The literary man need never be idle, for his thinking powers—the tools of his trade—are always at hand. Bulwer, in his Caxtoniana, mentions this fact as a great advantage that the literary man has over all others. The mechanic has a definite task, assigned for certain hours, and when that is over, he feels free to rest. On the other hand, the powers of thought and composition are only interrupted by sleep, and the intensity of the labor is measured by our mental discipline and powers of endurance.

3. Brain-workers exercise more or less all the other organs of the body as well as the brain. Even the most secluded book-worm must use his muscles to a greater or less extent, and the great majority of literary and professional men are forced to take systematic and vigorous exercise, in order to keep their brains in good working order. On the other hand the uneducated and labouring classes, while they toil with their hands as their daily necessities require, are apt to let their brains lie idle, and thus the most important part of their nature undergoes comparatively little change, except that which comes from time and disuse.

KIND OF FOOD REQUIRED BY BRAIN-WORKERS.

If the brain could be used exclusively, without any exercise of the muscles, then the diet of brain-workers might be pretty exclusively confined to those articles which contain the fat, salts, and phosphorus, of which the brain is composed. But it is impossible to live by brain alone ; hence the necessity of a wide variety of food for the brain-working classes, of a quantity and quality adapted to nourish the *whole body*, with special reference to the nervous system.

The best food for the brain is fat and lean meat, eggs, and the cereals.

Is it now a matter of fact that brain-workers eat a better quality and larger quantity of food than mechanics and laborers. How is it with the different nationalities.

We have seen that the ruling people of the world, who have from time to time shaped the destiny of humanity, have always, so far as can be ascertained, been liberal feeders. This remark applies, of course, only to the ruling classes in these nationalities, and not to the slave or peasant class, who lived with them, but were not of them. But of the patrician or governing orders of society—the leaders of the world in legislation, in war, in commerce, in science, and literature—it is pre-eminently true. The dominant classes among the Babylonians, the Persians, and especially the Romans, were free and luxurious in their habits of eating, although, in those days, there was less variety of food than at present. The Greeks, the most intellectual of ancient nations, were formidable eaters; and their repasts were greatly prolonged. Of the Romans it has been said, that no people were ever so devoted to the pleasures of the table. Among modern nations the greatest eaters are the English, the Germans, and the Americans—the ruling people of our civilization. The diet of the Spaniards and Italians is notably less substantial than that of the English and Germans, just as their brains are less active and original.

Our standards, by which we measure nations and individuals, are too low and too narrow. I protest against the degrading spirit of materialism that would estimate a man by his weight on the scales, or by the number of years that it takes him to rust out. As if the human mind, with all its wondrous capacities, were created only to be imprisoned as long as possible, in a gross tabernacle of flesh, and nations were to be estimated, not by the thoughts they evolve, or the deeds of glory and usefulness they accomplish, but by the amount of adipose tissue their indolence enables them to hoard, or by the length of time that it takes them to die! Even the most ignorant hog-raisers studiously consider the *quality* as well as the quantity of pork that the different kinds of feed produce. And shall hygienists in their estimate of the effects of diet on humanity, only look at the number of pounds avoirdupois that result from the different systems, or the number of years that the body can endure them? We argue that because the porters of the East, the native Hindoos, the Chinese, and the Irish peasantry, eat little or no meat, and are well and muscular, and capable of a good measure of physical endurance; therefore, all people, in all climates, and at all seasons of the year, should be vegetarians, and thus the world would be much better than it now is. The flaw in this reasoning is, that it takes too low and material a view of humanity, and ignores entirely the fact that, although the body can be sustained and kept from dissolution for a considerable period on simple fruits, cereals, and the like, yet in the history of the world nothing very great or good has ever been bequeathed to humanity by a nation of vegetarians.

GREAT THINKERS USUALLY LIBERAL EATERS.

With some exceptions the same facts will apply to individuals. The great majority of the leading thinkers and actors of the world—the philosophers, writers, orators, legislators, warriors, inventors, and creators of new eras in every department of human thought—have fed their brains with a greater or less abundance and variety of animal as well as vegetable food. We have, in biography and general observation, sufficient data from which to form a satisfactory and reliable opinion. Goethe was a vigorous performer at the table, and even to an active old age retained his fondness for good dishes. Says Lewes, his biographer:

"His appetite was immense. Even on the days when he complained of not being hungry, he ate much more than most men. Puddings, sweets, and cakes were always welcome. He was fond of his wine and drank daily two or three bottles."

On this diet, and amid great literary activity prolonged to extreme age, he lived to see his eighty-third year.

Of Peter the Great, Marmontel says that "he dined at eleven o'clock, and supped at eight; an astonishing eater and drinker—two bottles of beer, the same quantity of wine, half a bottle, and sometimes a whole one, of brandy, at each of his two meals were scarcely sufficient for him, without reckoning the liquors and refreshments that he swallowed in the intervals."

I have studied with greater or less minuteness the biographies of nearly one thousand of the greatest thinkers of all nations and ages, and I find that aside from religious enthusiasts and some of the ancient philosophers who led very calm, inactive lives, very few were known to be abstemious.

Dr. Johnson was a gormandizer, and when indulging in his favorite dishes this Great Mogul of literature displayed his eagerness by manifestations of satisfaction that we supposed to be peculiar to children and some of the lower animals.

When Charles Lamb was boarding, he sometimes invited friends to dine with him, paying the landlady a small sum. He observed that when Wordsworth dined with him, the landlady charged a sixpence more, and one day remonstrated with her on the injustice of such discriminations, at the same adding that Wordsworth was a great poet. "Don't know about the great poet," replied the landlady, "but I know he is a great eater."

The popular conception that those who think much, eat little, is derived from the twofold fact that *some* of the great philosophers have been comparatively abstemious, and from the fact that nearly all hard brain-workers care little for their meals when they are in the midst of severe tasks. In great crises they abstain perhaps for several days, as did Elliott, the defender of Gibraltar, but pay-day comes, and they must replenish their wasted tissues or suffer the penalty. There is little doubt that some authors have shortened their lives by habitual underfeeding.

We can best arrive at the truth in this matter by comparing different bodies or classes of men, and not by selecting individual cases. Students in academies and colleges, provided they are in good health, study faithfully, and do not exhaust themselves by vices, eat more, according to my observation, than young men of similar ages, in ships, and behind the plough, and far more heartily than mechanics and artisans. None who board students, whether academical, collegiate, or professional, ever regard themselves as light eaters. Those exceptions who worry or fret themselves into nervous debility, or who destroy themselves by vices, only prove the rule.

Clergymen are also large eaters. Whatever their theories may be, they practically acknowledge that those who work with their brains need better nourishment than those who allow their intellects to lie idle.

I know very well that it is possible for some temperaments to study hard, for a limited season, on a spare diet. There have been, and are now, hard students in our colleges, who, either from necessity or more likely from mistaken notions of hygiene, restrict themselves to a meagre and unsatisfying allowance. With all such persons the evil result that must follow such a course, as surely as the night follows the day, is surely a question of time. There are those whose constitutions are so hardy, whose reserve powers are so abundant, that they can live for a considerable time on their capital. They can rise early and sit up late, and toil hard and long over their books, achieving the highest success in scholarship and literature, on an insufficient and unnutritious diet. But the pay-day must come with them just as surely as with the poorest and feeblest, only it may be longer deferred.

To recapitulate in a few words: the diet of brain-workers should be of a large variety, delicately served, abundantly nutritious, of which fresh meat, lean and fat, should be a prominent constituent. In vacations, or whenever it is desired to rest the brain, fish may, to a certain extent, take the place of meat. We should select those articles that are most agreeable to our individual tastes, and, so far as possible, we should take our meals amid pleasant social surroundings. In great crises that call for unusual exertion, we should rest the stomach, that for the time the brain may work the harder; but the deficiency of nutrition ought always to be supplied in the first interval of repose.

Lectures and treatises on indigestion abound, but many of them are not worth reading.

The following lecture by Dr. Foulis, however, is an exception to the rule. It is not too condensed for general readers, nor does it abound with technical terms. Much useful information is attainable from such a lecture on indigestion, when it is written in such plain language. A modified diet for this climate for healthy adults should contain about 40 ounces of dry food; four ounces of it should be flesh forming, and 16 ounces of it should be heat giving materials.

HOW WE DIGEST OUR FOOD.

By Dr. Foulis.

Man stands at the head of the animal world and has all things in subjection under him, yet he comes from an extremely minute germ or egg, not more than the $\frac{1}{200}$th part of an inch in diameter, and weighing scarcely the $\frac{1}{1000}$th of a grain. An adult man weighs about 130 pounds, so that he weighs a thousand million times more than the germ from which he started.

This little egg or germ, if placed in suitable conditions, has within it the power of absorbing or imbibing nourishment. It has no lungs, no stomach, no heart, or any trace of an organ of digestion; and yet it will grow and develop into a perfect human being, if the conditions favourable to such development are present. The first trace of the development consists in the division of the little egg in two halves. It actually divides itself into two halves—then each half divides itself, and then each quarter divides itself, and this division goes on until the whole egg is reduced to an immense number of little bodies called *cells*. Each of these little cells, though much smaller than the original egg, is very like it in structure. The mass of cells thus produced continue to absorb nourishment from the mother's blood, just as the egg did in the first instance Presently the cells arrange themselves in a peculiar manner, some of them develop into the brain and spinal marrow, others develop into heart und lungs, others into bone, and so on until the perfect little human being is formed. Now what I have told you of the first steps in the development of man, is exactly the same as takes place in the first steps of the development of every vertebrate animal. In the cat, the dog, the monkey, the elephant, and all the other animals of this class, a minute egg is the first trace of the animal. Division and subdivision of the egg takes place, and then the minute bodies or cells formed by this process of division gradually give rise to the different organs and the distinguishing characteristics of each animal.

I mention these few facts about the first steps in the development of man, because I wish to direct your attention to the wonderful power possessed by the small bodies which we term "*cells*." I shall have to show you that in the human body there are millions upon millions of minute cells, all undoubtedly derived from the original germ or egg, and that these cells are really the means by which we digest our food. I shall have to show you that although we eat food, we, as individuals, do not digest it.

We cannot digest our food, let us try ever so hard. We do not digest our food by any effort of our wills. We cannot convert our food into flesh and blood any more than we can control the beating of our hearts. The digestion of food, or the process of converting it into soluble material so that it may pass into the blood, is entirely carried out by the agency of countless millions of cells lining the alimentary canal, over which we have no direct control whatever. I hope to make this clear to you by-and-by.

Before the child is born, although it possesses a stomach and intestines, a mouth, and other organs of digestion, it does not *eat* food. Such nourishment as it requires is absorbed from the mother's blood. The mother eats the food and digests it, while the child absorbs such nourishment as is necessary for its development. This absorption of nourishment by the child takes place without either the mother or child knowing anything about it.

When the time has arrived for the young child to lead a separate existence, it comes into the world the most helpless of all animals. Before its birth no air entered its lung; but now on coming into the world it opens its mouth and begins to cry lustily. By this means it breathes the breath of life; but with this breath of life it also breathes in a tendency to death, for if it breathes the oxygen of the air it begins to waste or burn away, and if not fed with milk or other approprirte food it will surely die. Let it have food, and the minute cells which constitute the essential parts of the organs of digestion will convert this food into flesh and blood, and the young creature will grow faster than it can waste away; and thus it will pass from childhood to boyhood, and from boyhood to manhood.

When fully grown a man has more than 200 bones in his skeleton. In the skull we see the cavity which contains the brain—the organ of mind. The eyes, the ears, the nose, the mouth, are situated in close relation to the brain. In the vertebral column is a tube which contains the spinal marrow, and attached to the spinal column are the ribs, which enclose the chest cavity, in which are placed the heart and lungs. Then we see the different bones which form the arms, and legs, and hands. All these parts are clothed with muscles.

There are more than 400 muscles in the human body. The muscles, by contracting, move the limbs. It is by means of the muscles that we can walk about and move our bodies from one place to another. There is a very remarkable muscle called the *diaphragm* or *midriff*, which runs across from the bottom of the ribs to the spine, shutting off the cavity of the chest from the abdominal cavity. In the cavity of the abdomen are placed the organs of digestion, the *stomach*, *liver*, *intestines* and *pancreas.* In the chest the heart and lungs rest on the upper surface of the muscle called the diaphragm.

The whole body is clothed with the skin or integument. This skin can be easily removed from all parts, but at the margins of the various apertures of the body it seems to stop, and becomes continuous with the mucous membrane which lines all those internal cavities, such as the alimentary canal, into which the apertures open. Every well nourished body has a considerable quantity of fat between the skin and the muscles, and it is this fat which gives such beauty and roundness of form to the human body. Sometimes the fat is of enormous thickness. In very stout people fat under the skin is sometimes several inches in thickness. It is often deposited in a very thick layer under the skin over the abdomen. In this situation I have seen it seven inches thick. In the skin over the surface of the body there are numerous sweat glands. These glands are minute tubes, and are about two and a half millions in number, and to show you how important they are as organs of perspiration, I may tell you that if these little tubes were placed end to end, they would form one tube 28 miles in length. While you judge of the beauty of the human body when properly nourished, as depicted in the statue of the Three Graces, as a contrast you may look on the horrible effects of starvation. In the famine at Orissa, in India, several years ago, many thousands of our fellow-creatures were starved to death.

What I now show you is a photograph, from life, of some of the poor starved creatures. Only those who have witnessed death from starvation know of its horrors. Let us who have a good supply of food, although from other nations, think twice before we venture to tax the food supply of this country.

Now the body of a living man is always in a state of activity. Even when he is asleep, although the head and limbs are quiet, the heaving chest shows that some parts are active. At all times, day and night, the heart is beating, driving the hot blood to all parts of the body to nourish the various tissues, and to take up the effete and used up material which are conveyed to the lungs, skin, and kidneys, to be thrown off from the body as excretions.

All work means waste. No fire can burn without the coal being consumed, and ashes remain.

Suppose we have a room with walls of ice. As long as the air in the room is *ice* cold, the walls of the chamber will not melt. Let us carefully weigh a healthy living man, and then make him walk up and down in the room for an hour. In doing this he will clearly exert a good deal of mechanical force. At the end of an hour we shall observe that a certain amount of ice has been melted, showing that the man has given off heat in abundance. And if we now examine the air of the room, we shall find that it contains moisture which has been breathed out by the man, and has been given off from his skin by perspiration. If at the end of an hour we again carefully weigh the man we shall find that he has lost weight Now, from all this, we learn that a living active man constantly exerts mechanical force, gives off heat, evolves carbonic acid and water from his lungs and skin, and undergoes loss of weight.

Now it is quite clear that this sort of thing could not go on for long without the man wasting away to nothing.

Long before this takes place, however, the man feels hunger and thirst, a craving for food and drink and fresh air with which to build up and to restore the body to its former weight.

For this purpose man takes into his mouth, and then passes into his alimentary canal, every day a certain quantity of food in the form of meat, bread, butter, water and the like. It is important that you should ever bear in mind that the substances used as food come under four heads :

1st. The nitrogenous food, such as the gluten of wheat, the albumen of white of egg, the fibrine of blood, the syntonin of muscle, the casein of cheese.

2nd. Fatty foods, such as all vegetable and animal oils —as butter, bacon, and oils, &c.

3rd. Starchy foods, such as starch and sugar, and nearly all the farinaceous foods, such as arrowroot, corn-flour; potatoes, come under this head.

4th. Mineral matters—under which head are water and the salts of various metals.

Food, then, in the form of nitrogenous, fatty, starchy, and mineral material, separately or altogether, are introduced into the alimentary canal. *The whole purpose of digestion is to reduce these foods into a condition either of solution or extremely fine division, in order that they may readily pass into the blood through the thin membranes which form the walls of the capillary blood-vessels in the mucous membrane of the alimentary canal.*

THE TEETH.

In the mouth the food is subjected to two different operations, viz., Mastication and Insalivation. By mastication, or chewing, the food is cut up and ground down by the teeth to a state of minute division. This is entirely a mechanical process. It is necessary, in order that the food may be properly acted on by the different digestive fluids. The teeth are very important organs of digestion. There are marked differences in the teeth, both as to structure and action, corresponding to the habits of the animal and the food it eats.

In fishes and serpents the teeth are generally in the form of spines curved backwards; they serve to catch and hold their prey, and to prevent its escape. In such animals the food is swallowed whole or in large masses, and the digestion is very slow.

In animals which eat flesh, such as the lion, tiger, cat, and dog, there are three different kinds of teeth. The cutting teeth, or incisors, are six in each jaw; these cut the food like a pair of scissors. Next to these are long teeth, in the form of tusks; they are pointed and conical. They enable the animal to get a good hold of its prey, and they pierce the flesh through and through. Then come the molars, or grinders, eight or more in number on each side; they are large and broad teeth, with sharp edges, which have several points or cusps, like the teeth of a saw. In flesh-eating animals the chewing process is very imperfect. The flesh is not ground down, but is only pierced through and through, and mangled before it passes into the stomach.

In animals which live on vegetable food, such as grass, the cutting teeth, or incisors, are only in the lower jaw in those animals which "chew the cud;" but in the horse they are found in both upper and lower jaws. In these animals the incisors simply nip off the blades of grass. The chewing is performed by the grinders. The grinders are large and flat, and their surfaces have projecting ridges of hard material, called *enamel.* By the lateral rubbing motion of these rough surfaces together the food is reduced to a soft pulpy mass.

In the human being the teeth present the characters of the teeth of the flesh-eating and of the vegetable-eating animal.

The incisors are four in number in each jaw. The canines are much less prominent and pointed than in flesh-eating animals. The molars, or grinders, are thick and strong, and have on their surfaces little points or cusps, like we see in the teeth of flesh-eating animals. There can be little doubt, from the structure of the teeth alone, that man is both a flesh and a vegetable-eating animal. Man chews his vegetable food just as perfectly as do the grass-eating animals, and he chews his meat much more perfectly than do the flesh-eating animals.

The teeth perform a most important part of the digestive process. If the food is not properly chewed or masticated, and is swallowed in masses or undivided lumps, it will remain in the stomach a long time undissolved and prove to be a source of irritation to the delicate mucous membrane of the stomach, but if it is properly chewed, and reduced to a state of pulp before it is swallowed, it is then readily attacked by the gastric juice and other fluids, and is rapidly dissolved ; hence the great importance of thoroughly chewing food before it is swallowed.

In the human being, each little tooth consists of a crown, a neck, and fangs. The crown is that part which projects above the gums, and is covered with a layer of enamel—the hardest substance in the body. Beneath the enamel is the dentine, a substance like ivory. In the centre of the dentine is a cavity termed the *pulp cavity*, which contains the tooth pulp, a very sensitive body, consisting of bloodvessels and nerves which enter the tooth through a small opening at the end of the fang. Where the teeth rub against each other the enamel and the dentine wear away; but the dentine being much softer than the enamel, wears away more quickly. In the front teeth of animals such as the beaver, the rat, the hare, and the rabbit, the edges are very sharp. The sharp edge consists of enamel, which has not worn away so quickly as the dentine.

In the human being teeth are objects of great beauty when free from decay and properly arranged. Decayed teeth injuriously affect the health in two ways. When broken down they do not grind the food properly, and when decayed they make the breath offensive, because there is always an offensive odour around a decayed tooth. If the teeth are not cleaned day and night, little particles of food get in between the teeth, near the gums, and irritate the latter, which become inflamed, and a white cheesey looking material is apt to accumulate on the edge of the gums. If a very small speck of this white cheesey material is mixed up with some spittle and examined under high powers of the microscope, it is found to consist chiefly of a sort of fungus, and in among the branches of the fungus are myriads of minute, rapidly moving animalcules called *vibrios* and *bacteria.* It is an extraordinary sight, and once a person has seen it I think he will not neglect to clean his teeth day and night. The teeth may be well cleaned by brushing them with soap and water morning and night. After cleaning the teeth in this way, the mouth may be made sweet by washing it out with a teaspoonful of Condy's fluid, dissolved in a tumbler of warm water.

THE SALIVA.

As the food is being chewed, it is at the same time mixed with the *saliva* or spittle. This saliva is the first of the digestive fluids.

The mucous membrane of the mouth is dotted over with minute tubules, called "buccal glands." These tubes are lined with extremely minute cells. The spittle or saliva is not a simple fluid. It consists of four distinct fluids The buccal glands pour out a quantity of mucous, which mixes with the secretions which come from the *parotid*, *submaxillary*, and *sublingual* glands. The latter glands exist in pairs. Each parotid gland lies in front of the ear, and behind the angle of the jaw; and its duct opens into the mouth opposite the second grinder tooth of the upper jaw. The submaxillary glands and sublingual glands are placed in the floor of the mouth, and they pour their secretions into the mouth through two little openings which lie under the tip of the tongue, behind the front teeth of the lower jaw. These three glands swell up to a great size when a child has the mumps.

The saliva is a thin watery fluid, and contains in solution a small quantity of a remarkable substance called *ptyalin*, which possesses remarkable properties.

It does not affect in the least nitrogenous food or fats; but if mixed with starch and kept at a warm temperature, the saliva in time will convert starch into grape sugar. Starch is quite insoluble and useless as nourishment, but when acted on by saliva it becomes a highly soluble and nutritious form of sugar called grape sugar. How is this saliva manufactured? It is poured out to the extent of about 1½ lbs. in twenty-four hours.

The parotid and submaxillary glands and sublingual glands are good examples of what are called *racemose* glands. They are in general form like a small bunch of grapes. The main stalk represents the duct by which the secretion enters the mouth. The parotid gland consists of a great number of little sacs or bags, and each little bag is lined with a layer of extremely minute cells. Each little bag has on the outside of it an immense number of little bloodvessels. When the parotid gland is secreting its fluid, the little cells lining the bags or sacs imbibe from the blood circulating around them such material as they require, and they manufacture it into saliva. We cannot make them do this, nor can we prevent them forming saliva by any effort of our will. The mere presence of food in the mouth causes these little cells to begin their work. The smell of a delicious dish is sometimes sufficient to make them pour out their secretions, and then the mouth "waters," as we express it. The saliva formed in each little bag is poured out into the main duct or channel, and through this into the mouth. Thus during the chewing of food, spittle is being poured into the mouth by the buccal glands, by the parotid, submaxillary, and sublingual glands. When first poured out this saliva is alkaline. Besides acting on the starchy elements of food and converting them into soluble sugar, the saliva keeps the mouth constantly moist. It also dissolves sugar and salt, which form part of our food; and it also makes the chewed food slippery and easily swallowed.

It is important that you should know that these salivary glands are not active in the child until the age of four or six months. Hence to give a child of such an age much starchy food such as arrowroot or corn flour, means to poison it. I have frequently seen children at this tender age suffering from diarrhœa and other troubles of the digestive system brought about by starchy food, which the poor child was quite unable to digest.

When the food is thoroughly chewed and mixed with saliva it is carried backwards by a semi-involuntary movement of the tongue, which at the same time presses down the epiglottis over the entrance into the windpipe, and the bolus of food is pushed into the commencement of the *œsophagus* or gullet, where, by the muscular action of the coats of the tube, it is carried down into the stomach.

Drink is taken in the same way. We must not suppose that the bolus of food and the gulps of water simply drop down from the back of the mouth into the stomach. This is not the case. Each mouthful is pushed backwards by the tongue, and then it is grasped by the muscular coats of the gullet and pushed down into the stomach. It is by means of this muscular action of the gullet that jugglers are able to eat and swallow food and drink while standing on their heads, and by this means the ox or the horse is able to drink water while its head is lower than its stomach.

THE GULLET.

The gullet or œsophagus is a tube about nine or ten inches in length. Above it is continuous with the *pharynx*, whose mucous membrane is continuous with that lining the back of the mouth. The gullet passes down immediately behind the windpipe, through the chest, and then passing through the diaphragm it at once becomes connected with the stomach near its large dilated cardiac end. I remember, when I was a boy, being told that a whale could not swallow a man, because its swallow or gullet was so small. It was supposed, because the whale fed upon small fish and extremely minute creatures in the sea, that therefore it must have a small gullet. It fell to my lot some years ago to dissect the large whale which, you may remember, was thrown on the shore at Longniddry and then towed across to Kirkcaldy, and I made a point of ascertaining the exact size of the gullet. Now, without giving you the exact figures, I may tell you that a man could pass down the whale's gullet just as easily as he could slip down the barrel of one of Sir William Armstrong's 100-ton guns! If the whale which was said to have swallowed Jonah was anything like the whale which I cut up, all I can say is Jonah must have had a very uncomfortable time of it, for in our whale's stomach there was about two tons weight of herrings and codfish, mixed up with no end of fish bones and several gallons of rancid oil. It is right, however, to say we are not told it was a whale that swallowed Jonah, but "a great fish." A whale is not a *fish* at all, but belongs to the class of animals to which man belongs. It is a mammal, and gives suck to its young one. No fish does that.

Every organ of digestion within the abdomen is invested by the *peritoneum*, a delicate membrane which lines the whole cavity of the abdomen, and then passes over every organ, giving a covering to each, and serving to bind them in their places.

THE STOMACH.

The stomach may be described as a large dilated tube, very like the bag of a bagpipe. One end of this dilated tube is much more blown out than the other end. This widely dilated part of the stomach is called the *cardiac* end, because it lies up against the under surface of the diaphragm, just under the heart. When the end of the stomach is full of wind the heart is often pressed upwards by it, and beats more powerfully against the chest wall, making a person believe he has some serious affection of the heart. The right end of the stomach gradually tapers off, and becomes continuous with the small intestine. Just before the stomach joins the intestine there is a valve, known as the *pyloric* valve, and the portion of the stomach near it is called the pyloric end of the stomach. The first part of the intestine in connection with the stomach is called the *duodenum*.

When the stomach is well filled it measures little more than twelve inches in length, and its greatest diameter is about five inches. If cut open and spread out like a handkerchief it would cover a space 1¼ feet square. The stomach does not lie straight across the upper part of the abdominal cavity. The bulged out cardiac end lies close against the under surface of the diaphragm on the left side, but the pyloric end of the stomach is situated much lower down on the right side, just below the margin of the ribs. From the lower border of the stomach there hangs down a beautiful membrane, known as the *omentum*, which serves as a protection to the coils of intestine which are beneath it.

Underneath the peritoneal coat of the stomach there are two muscular coats—an external and an internal muscular coat. The fibres of the external muscular coat run along from the cardiac end to the pyloric end of the stomach, while the internal muscular fibres wind round the stomach something like the hoops round a barrel. But the most wonderful part of the stomach is its mucous membrane.

The mucous membrane covering the tongue lines the back of the mouth, then passes down the gullet, then lines the whole of the stomach, and then lines the whole of the intestines. We doctors are continually looking at the tongue of our patients ; why do we so ? It is not to tell us how the tongue itself is, but to tell us how the mucous membrane of the stomach and intestines is. There is a wonderful sympathy between all parts of the mucous membrane, throughout the entire alimentary canal, and when one part is out of order, sooner or later the mucous membrane of the tongue will get out of order too ; so by examining the tongue carefully we often can tell how the mucous membrane of the stomach and intestines is. I told you that the mucous membrane of the mouth was everywhere studded with buccal glands. So the mucous membrane of the stomach is everywhere studded with very remarkable tubular glands, whose duty it is to pour out the gastric juice during the digestion of food. When digestion of food is not going on the mucous membrane of the stomach is of a delicate pink colour, and is arranged in longitudinal folds ; when the stomach is distended with food these folds disappear.

If we examine a portion of the mucous membrane of the stomach near its cardiac end with an ordinary lens or magnifying glass, we find that its surface presents a peculiar honeycombed appearance, produced by shallow, many sided depressions or pits. In the bottom of these pits are the openings of little tubes which lie side by side, and arranged in a perpendicular manner. Each little tube is lined by a great number of little cells, which have the power of abstracting from the bloodvessels which lie in the wall of the stomach the materials out of which they make the gastric juice. Each little tube has a number of minute bloodvessels round about it in close contact with it, so that the cells lining the tube can easily imbibe from the blood the materials they require.

GASTRIC JUICE.

These *peptic* glands, as they are called, when food is taken into the stomach, pour out a thin acid liquid called the *gastric juice*, which owes its acidity to the presence of hydrochloric or lactic acid. The gastric juice also contains a very remarkable substance known as *pepsin.* You remember that the cells lining the little sacs of the salivary glands poured out a thin liquid, which is alkaline, during the time the food is being chewed.

When food such as bread and meat, &c., is undergoing digestion in the stomach, the contractions of the muscular coats of the organ roll the food about, and at the same time the gastric juice is being constantly mixed with it.

During the years 1825 to 1832, Dr. Beaumont of the United States Army made a great number of observations on the process of digestion. He was fortunate in having a man exactly suited for his experiments. This man's name was Alexis St. Martin. He was a Canadian boatman, who had an opening into the cardiac end of his stomach caused by the accidental discharge of a gun. The gun which shot St. Martin was loaded with buck shot, and blew away a large piece of the wall of his chest, and made a big hole in the cardiac end of his stomach. This terrible wound healed, but there was left an opening in the skin, which communicated with the interior of the man's stomach. Dr. Beaumont used to look into the man's stomach while digestion was going on; and he found out that gastric juice was poured out only when food was in the stomach. Immediately after food is introduced into the stomach, the delicate pale pink mucous membrane becomes red and turgid with blood, and there appear everywhere little minute drops of gastric juice, just like the drops of sweat on a man's brow. These drops gradually run together and flow down the wall of the stomach to soak into the substance of the food.

Dr. Beaumont used to put a tube into the man's stomach, and suck out a quantity of the gastric juice, with which he experimented; and he found that if he mixed the juice with meat or white of egg in a glass, and kept it at the temperature of the body, it would digest these substances nearly as quickly as if it were in the stomach. He also used to tie pieces of different kinds of meat on a string, and then pop them into the man's stomach; at different times he pulled out the strings, and noticed how far digestion of the various meats had proceeded. As the result of such experiments, he found that tripe was digested at the end of one hour; roast beef at the end of three hours; roast mutton at the end of three hours and a half. Salt beef took four hours and a quarter, while roast pork took five hours to digest. He also told us that roast turkey was thoroughly digested at the end of two hours and a half. Not many of us get a chance of trying our digestions on roast turkey!

Now, gastric juice will not digest every kind of food. It affects only a single class of food, namely—the nitrogenous food, such as meat and albumem of white of egg, the gluten of bread, the casein of cheese, and such like. It has no effect on starch, or oils and fats; but solid and semi-solid nitrogenous foods are at once attacked and liquified by the gastric juice.

This power of digesting nitrogenous foods depends upon the presence of pepsin and acid in the gastric juice. The effect of digestion in the stomach is to convert the food into *chyme*, which is always a thick liquid, like gruel or thick pea soup, and has a strong disagreeable acid smell and taste. The quantity of gastric juice varies from 10 to 20 pints in twenty-four hours.

Mixed up with the meat we eat there is always a lot of starchy food, such as exists in the potato and bread, and there is always some fat or oily matter in our ordinary diet. On these substances the gastric juice has not any action. They must be attacked and digested by other fluids before they can be absorbed.

Salt and sugar are dissolved by the gastric juice, and may pass at once with the soluble peptones into the blood-vessels in the walls of the stomach.

One remarkable character of the gastric juice, besides those mentioned, is, that it has the power of correcting and preventing putrefaction. Many men like game, "high," as it is called; such flesh is always in a state of putrefaction. The gastric juice corrects this, or else disease would result from eating such flesh. Such starchy material as was well digested by the saliva, along with sugar and salt, is rapidly absorbed by the bloodvessels of the stomach; but there is always a considerable quantity of starchy food that has escaped the action of the saliva.

Digestion of starchy food by the saliva in the stomach is put a stop to by the acid gastric juice, which renders the saliva powerless by neutralising it. All the time digestion is going on the pyloric end of the stomach is tightly closed, but towards the end of digestion the contractions of the stomach squeeze the chyme through the pyloric valve, and it then passes into the intestines. Only a small quantity of the soluble peptones are taken up by the bloodvessels of the stomach. A very large quantity of these rich nutritious peptones are taken up by the bloodvessels in the wall of the intestines, and from thence passed into the blood.

Man does not "chew his cud." I know a gentleman, however, at the present moment, who can bring up food from his stomach into his mouth at will, and chew it over again.

And now we have to consider what takes place after the digested food has passed out of the stomach into the intestines.

The first part of the intestinal tube is called the *duodenum.* It is about 10 inches in length. In man the intestinal canal is about 25 feet in length.

As a rule in flesh-eating animals it is short, and in vegetable-eating animals it is long. In the sheep it is 30 times the length of the animal itself, while in the giraffe the intestine is about 134 feet in length.

The length of the alimentary canal in grass-eating animals is probably owing to the low nutritious character of the food they eat.

The intestinal canal of man is divided into large and small intestines. These two are continuous with each other. The small intestine communicates with the large intestine by means of the *ileo-cœcal* valve, which allows the food to pass from the small intestine into the large intestine, but does not allow it to go in the opposite direction.

The intestinal tube, like the stomach, is covered over by the peritoneum. By means of this covering the coils of the small intestine hang down from the backbone into the cavity of the abdomen. The peritoneal membrane which thus supports the coil of the intestine is called the *mesentery*. It is a double layer, and between the folds are an immense number of bloodvessels, nerves, and lymphatic glands and vessels.

The intestinal canal, like the stomach, has four coats—the peritoneum, the external and internal muscular coats, and the mucous coats; all these structures are continuous with the similar structures of the stomach. The muscular fibres of the external coat run in the direction of the tube of the canal, while the fibres of the internal muscular coat surround the mucous membrane like the hoops of a barrel.

In the mucous membrane of the duodenum are numerous glands called the *glands of Brünner*. They are like little salivary glands, only very small, and they pour out a fluid which mixes with the chyme after it has passed through the pyloric valve of the stomach.

Throughout the entire mucous membrane of the small and large intestine there are imbedded an immense number of small tubes called the *follicles of Lieberkuhn*. Each little tube is about the $\frac{1}{360}$ of an inch in diameter, and about five times as long as it is broad. These minute tubes are lined with extremely small cells, which pour out a peculiar fluid called intestinal juice, just in the same way as the glands of the stomach pour out the gastric juice. Now this intestinal juice has the wonderful power of acting on starchy foods in such a way as to convert them into soluble sugar, so that the starchy foods which escaped digestion in the mouth and stomach are now digested by the intestinal juice.

Perhaps the most important structures in the small intestine are the *villi*. On placing a small piece of the mucous membrane in a little water it will be seen to have a velvety appearance; this appearance is caused by the presence of an immense number of minute conical projections of the mucous membrane known as villi. These villi vary in size from the $\frac{1}{40}$th of an inch to the $\frac{1}{12}$th of an inch, but some are not more than the $\frac{1}{120}$ part of an inch in diameter. They cover the whole surface of the mucous membrane.

From the duodenum down to near the end of the small intestine the mucous membrane is arranged in transverse folds, which go nearly round the tube of the intestine. These folds are called *valvulæ conniventes.* They increase enormously the extent of the mucous surface, and as the villi cover the *valvulæ conniventes* as well as other parts of the mucous membrane, some idea may be formed of the great extent of surface there is in the small intestine. It has been calculated there are more than 4,000,000 villi on the surface of the mucous membrane of the small intestine.

The villi have a remarkable structure. Each contains a small artery which breaks up into many small veins, which end in one or more larger trunks, and then pass out of the villus again. In the middle part of the villus is a whitish looking tube, called a lacteal vessel, which is an offshoot from an immense number of minute lacteal tubes imbedded in the submucous coat of the small intestine. As will be afterwards explained, the lacteal vessels absorb the fatty portions of food as they pass along the intestine.

The villi hang down from the intestinal mucous membrane, and as the food passes onwards they suck up the liquified portions of it with astonishing rapidity. The rapidity with which they absorb depends very much on the rapidity of the circulation of blood through the small bloodvessels in their interior. By the contraction of the muscular coats of the intestine, the digested food is squeezed onwards, and at the same time the villi are pressed against the passing food, and in this way they are better able to absorb the liquified portions of it. They absorb soluble peptones, soluble sugar, and a certain amount of emulsified fats and oils. The lacteals, however, absorb the greater proportion of the fats when digested. By this wonderful process of absorption the liquified and digested food is taken up by the minute blood vessels in the villi, and then the veins in each villus convey blood saturated with nourishment into the larger veins which lie between the folds of the mesentery. These latter veins gradually converge upwards to a large vein called the *vena portae*, which enters the liver at its under part.

At the end of the small intestine there remains little else but the indigestible portions of the food and the refuse of the intestinal secretions. These pass through the ileo-cœcal valve into the large intestine, where they are further acted on by the secretions from the large intestine, and anything that is nutritious is absorbed, while the rest is cast off from the body as useless material.

While the food is passing through the duodenum, it is mixed with the bile which comes from the liver, and with the fluid which is secreted by the pancreas.

THE PANCREAS.

The *pancreas* is a long, flattened gland, about eight inches in length. and one and a half broad, and nearly an inch in thickness. It lies right across the back bone in front of the large blood vessel called the *aorta* and its duct opens into the duodenum near its lower part. In structure it is like a salivary gland. The fluid secreted by the pancreas has the wonderful property of converting fats and oils into a complete emulsion, by which means they are readily absorbed by the lacteals of the villi, and by the small blood vessels.

This power of emulsifying fats and oils depends on the presence of a peculiar substance, named *pancreatine*, in the pancreatic fluid. Pancreatic fluid also has the power of converting starch into grape sugar.

THE LIVER AND BILE.

The *bile* mixes with the food in the duodenum just at the point where the pancreatic fluid was poured into the intestine. When freshly poured out, it is of a yellow or reddish colour. It has a strong, bitter taste, and it is neutral or slightly alkaline in its reaction.

The process of secreting bile is continually going on, but it is formed very slowly when one is fasting; when food is being digested, the bile is poured out in large quantity. The amount of bile poured out into the intestines varies according to the amount of food taken, but on an average there is secreted from 30 to 40 ounces in 24 hours.

The bile is formed in the liver by the liver cells. The liver itself weighs between 50 and 60 ounces. It is situated on the right side of the abdomen, and fits up against the under surface of the diaphragm on the right side, just as the cardiac end of the stomach fits up against the under surface of the diaphragm on the left side. It should not be felt below the margin of the ribs on the right side. It has a coat of peritoneum which binds it in its place.

It consists of an immense number of small *lobules* about the twentieth of an inch in diameter, which from mutual compressure have a polygonal shape. Now, each of these lobules consists of an immense number of minute cells, called hepatic or liver cells, whose duty it is to secrete the bile. They vary in size from the $\frac{1}{800}$th to the $\frac{1}{1000}$th of an inch in diameter, and from being pressed together they are polygonal in outline.

These little liver cells extract from the blood the material out of which bile is made, just as the cells in the peptic glands extract from the blood the material out of which the gastric juice is made. In each lobule there is an extraordinary capillary network of minute veins, which come from several branches or offshoots from the large vena portæ. Now you remember the vena portæ is the large trunk formed by the union of all the veins coming from the stomach, pancreas, and intestines. It is a large vein which enters into the liver on its under side, and conveys to the liver the blood which comes from all the organs of digestion, and this blood is loaded with the absorbed products of digestion.

This vena portæ gives off numerous small branches which pierce each lobule, and then split up into an extraordinary mesh of extremely small veins. In the mesh work thus formed lie the little liver cells. By this arrangement the liver cells are brought into close contact with the blood, as it flows through the minute veins; and they are thus better able to imbibe from the blood the materials they require to manufacture into bile.

After the bile has been manufactured from the blood by these little liver cells, it is passed into small vessels or tubes called hepatic or *bile ducts*, and these convey it to the bag called the gall or bile bladder, and in this bag it is stored up when digestion is not going on; but when digestion is going on, the bile is constantly poured out into the intestine, as I have described. But what becomes of the blood in the extraordinary mesh-work of veins after the liver cells have done their work? Why, in each lobule it is again collected into one small venous trunk, which leaves each lobule, and then joining a great number of other such trunks, all together form one large vein called the hepatic vein, whose duty it is to carry the blood thus deprived of the elements of bile into a large vein, the inferior vena cava as it is called, leading directly to the right side of the heart. From the right side of the heart the blood is pumped to the lungs to be further purified, where we shall leave it for a short time.

Please do not suppose that the bile is brought to the liver ready-made and then extracted by the liver cells. It is not so. The blood which enters the liver by the portal vein contains no bile, but this fluid is entirely manufactured by the minute liver cells in very much the same way as the other secreting cells in the different glands manufacture their secretions. It is indeed a wonderful process. In these liver cells lies the power of extracting such material as they require for the manufacture of bile. The bile is very rich in hydrocarbons—that is, substances composed of the elements hydrogen and carbon. Thus a piece of dried bile will readily burn away if lighted in a flame. As a rule no bile is to be found in the blood, but sometimes the mucous membrane of the duodenum in the neighbourhood of the gall bladder's orifice becomes swollen and inflamed. Then the duct of the gall bladder, which has a very small opening, gets blocked up, and the bile, somewhere behind the point of obstruction, is apt to be absorbed into the blood. When there is bile in the blood the white of the eye at once shows a yellow tinge, and the skin may become as yellow as a guinea. The person thus affected is then suffering from *jaundice.*

Now for what use is the bile? It is important to remember that it is poured into the intestine at its upper part, so that it mingles with the chyme directly after it leaves the stomach. Now this arrangement clearly shows that the bile has some important relation to the food with which it is mixed. There is little doubt that the bile is, in the first place, an excretion—that is to say, the bile is the means of purifying the blood coming from the organs of digestion. It takes from the blood a large quantity of impurities which, if they passed on into the general circulation, would be injurious to the body. The liver is placed as a filter between the organs of digestion and the right side of the heart, and without doubt, one of its chief duties is to filter the blood of those materials which collectively make the bile. But the bile, when once formed, has important digestive functions, of which the chief are—

1st. It assists in emulsifying the fatty portions of the food, and thus makes them more easily absorbed by the lacteals in the villi.

2nd. By moistening the mucous membrane of the intestines the fatty matters of the food are more readily absorbed.

3rd. It has a marked antiseptic power like the gastric juice. When thoroughly mixed with the food it prevents its decomposition, and the formation of gas in the intestine.

4th. As it passes down the intestine it seems to stimulate the follicles of Lieberkühn to pour out their secretions more copiously; and it also stimulates the muscular coats of the intestine to contract, and thus to drive onwards their contents.

After the bile has done its duty in assisting digestion, it undergoes some peculiar changes in composition, and is re-absorbed into the blood, and being a highly hydrocarbonaceous material it is oxidized, and by its combustion helps to maintain the heat of the blood.

But there is another wonderful function performed by the liver, and that is the formation of a substance which readily is converted into grape sugar. A Frenchman, Claude Bernard, 1848, after a number of experiments, found that a substance named "glycogen," or "sugar former," was manufactured in the liver cells, and that this substance rapidly became converted into sugar, and passed into the blood in the form of grape sugar, and by the oxidation of this sugar in the lungs the heat of the body is kept up.

This formation of glycogen in the liver is a normal process, and so is its rapid conversion into sugar. Sometimes so much sugar is thus poured into the blood that some of it appears in the secretion from the kidneys, constituting the disease called "glycosuria." The well-known disease *Diabete mellitus*, in which a large quantity of sugar is daily found in the secretion from the kidneys, has some close relation to the normal glycogenic function of the liver.

Let me now, in conclusion, give a summary of the changes which take place in the food during its passage through the stomach and small intestine. In the stomach the food is thoroughly mixed and converted into a uniform mass. It is saturated with the gastric juice which dissolves the nitrogenous portions of it. The conversion of the starchy food into sugar, which began in the mouth, is now almost stopped in the stomach, and the fatty matters are thoroughly mixed up with the other constituents of food, but as yet they are not digested in the least. Soluble matters, such as sugar and salt, and those substances which have been rendered soluble by the action of saliva and the gastric juice, have begun to be absorbed by the bloodvessels in the wall of the stomach, and such fluids as wine and water also begin to disappear. That thick pea-soup liquid, the chyme, which results from the gastric digestion, is being continually squeezed through the pylorus into the duodenum. It consists of nitrogenous matters broken down and half dissolved, fatty matters broken down but not dissolved at all, starchy matters being slowly converted into sugar, and being dissolved in the fluids in which they are mixed as soon as they are converted into sugar. When it passes into the duodenum, the chyme is further mixed with fluid secreted by Brünner's and Lieberkühn's glands, and then with the bile and pancreatic juice. Now all these liquids have a more or less alkaline reaction, and by being mixed with the chyme the acidity of this latter becomes less and less, until, at the middle of the small intestine, it is decidedly alkaline in its reaction. In the upper part of the small intestine the fatty parts of the food are converted into an emulsion—that is, fat is converted into exceedingly minute particles, which are readily absorbed.

Those nitrogenous substances which were partly dissolved in the stomach are still further acted on by the gastric juice, and they are converted into soluble peptones, which are capable of easy absorption. The starchy constituents of the food are now rapidly acted on by the pancreatic and intestinal juices, and the sugar thus formed is quickly dissolved in the fluids, and is absorbed chiefly by the bloodvessels of the villi. The fatty emulsions are absorbed chiefly by the lacteals in the villi. As this fatty emulsion flows through the lacteals into the larger lacteal vessels, it is called *chyle*. The epithelial cells covering the surface of the villi seem to pick up the minute fatty molecules and then pass them on into the lacteal vessels. The chyle flows in the lymphatic or lacteal vessels through the mesentery, and then is acted on by the lymphatic glands, which are very numerous in this situation. As the chyle leaves the mesenteric glands it is much altered in physical characters, and contains a number of corpuscles, which gradually pass into blood corpuscles.

The chyle at last passes into a long tube, called the *thoracic duct*, which leads into the large veins entering the right side of the heart. In this way the fatty emulsified foods are carried into the blood, and there they become saponified or converted into a soapy material, which diffuses thoroughly with the blood. Those nutritious substances which have been absorbed by the bloodvessels of the stomach and intestines pass in the veins up towards the liver, and as the blood, rich in nutriment, passes through the liver, bile is manufactured from it, and the blood is thus purified. The blood then passes into the inferior vena cava, and then into the heart, from whence it is pumped to the lungs. Here it is acted on by the oxygen of the air. A large quantity of carbonic acid and watery vapour is excreted, and the blood, rich in nourishment and purified, is now sent by the contractions of the left side of the heart all through the body. It flows from the large bloodvessels into the smaller ones, and then into the myriads of minute capillaries. Here the cells or ultimate structures of each tissue, such as bone, brain, muscle, &c., abstract or imbibe from the blood the materials they require for their nutrition, and for the performance of their functions. Thus the cells of the brain extract material from the blood, and there can be no doubt that if they did not get the material they require there would be no manifestations of mind. The muscles and bones and different organs of the body take only the materials they require. Recollect it is the minute cells in each tissue that select these materials, and that before they can do so the blood must be spread out into the millions of capillaries which permeate every tissue. While the blood is thus giving out nourishment for the nutrition and growth of the various tissues of the body, it also takes in the effete or used up material, the ashes, as it were, that remain after work has been done, and passing onwards loaded with impurities it arrives again at the lungs, where carbonic acid and moisture are again thrown off. It arrives at the skin, where much moisture and animal matters are thrown off, and as it circulates through the kidneys a large quantity of the effete nitrogenous materials is thrown off in the form of *urea.*

It is the minute cells in the different tissues and organs of the body that do all the work. They require to be well fed. The object of the circulation of the blood is to take nourishment to them, without which they could not work. All work implies waste. The circulating blood while it feeds the cells takes from them the waste materials. The waste materials consists chiefly of hydrogen and carbon. These are got rid of from the blood by breathing fresh air or oxygen, and by taking plenty of exercise, by which means an enormous quantity of carbonic acid gas, with moisture and animal matters, is thrown off from the blood.

In conclusion, compare the original germ or egg with man as we have now seen him. What a wonderful change. And yet every tissue of his body is made up of cells, which are the descendants of the original germ. Can you wonder at my endeavour this evening to fix your attention on the marvellous powers of these small cells? Do all you can to live strictly in accordance with the best rules of health. Try to preserve the lives of these little cells by living temperately, with due regard to exercise and cleanliness. And never forget that your life is made up of the lives of these little cells, and if they perish you perish also.

Dr. Dobell has prepared the following normal

DIET TABLES,

that are, perhaps, as reliable as any. They are reliable so far as they accord with experience; and must, of course, be greatly varied by season, temperature, occupation, etc.

It has been estimated that the average consumption of *dry* food for Englishmen, in health, is from 700 to 750 pounds a year; or about two pounds daily, with five or six pounds of water.

FOOD FOR TWENTY-FOUR HOURS.

Either of These.

Oz.	No. 1.	Oz.	No. 2.
6	Meat, poultry, or game.	18	Bread.
4	Fish.	3½	Cheese.
10	Bread.	3	Bacon.
8	Potatoes,	1½	Sugar.
2	Rice.	5	Milk.
2½	Sugar.	20	Chocolate.
2½	Butter.	21	Tea.
5	Milk (liquid)	20	Water.
16	Coffee ,,	—	
16	Tea ,,	92 ounces.	
17	Water ,,		
—			
89 ounces.			

Oz.	No. 3.
16	Oatmeal.
22	Milk.
1¾	Butter.
¾	Sugar.
49	Water.
89½	ounces.

Oz.	No. 4.
25	Bread.
3¼	Cheese.
2	Butter.
60	Water.
90¼	ounces.

It will be observed that all of these tables contain all the necessary variety and quantity of food.

HERBAL REMEDIES.

The following chapters will be devoted to the description of several medicinal herbs, and will also contain forty herbal recipes. It is no longer the fashion to decry herbal remedies, for they are acknowledged to be safe and efficacious. The most ANCIENT medicines were herbal, and many of the most useful of MODERN medicines are derived from the vegetable kingdom. Though a medical man should be consulted in all doubtful or serious cases, yet every person should be acquainted with simple remedies for common ailments.

ALTERATIVE MEDICINES.

Writers on medicine have always recognised the existence of a class of remedies which have the power to alter or to modify the vital properties, or to change morbid states of individual tissue or the structure generally. We know that when in the course of certain diseases, in which there is great loss of vital power, as in malignant fevers, as well as scurvy, syphilis, &c., organic changes have taken place in the tissues, and even the fluids of the body the vital powers may be so supported and aided as gradually to arrest these alterations and restore the healthy condition. It may be said, perhaps, that these effects can only be brought about by the restorative efforts of nature, and that a pure air, suitable food, and proper hygienic conditions are all that is essential to the result. It is, however, evident that these powers are often assisted or even developed by those means which restore or promote nervous energy and change the condition of the blood.

The agents which effect these changes are known as alteratives. There has been much discussion as to the manner in which alteratives affect the system. Some call them dynamics, believing that they act only on the vital properties; other call them blood remedies, acting as antidotes to blood diseases. Whatever their mode of action may be, the result of their administration is to alter for the better the condition of the system. It is now well known that nearly all medicines are taken into the blood, and act through the medium of the circulation. When some poison circulates in the blood, alteratives are credited with the power of eliminating such poison from the system. Many of the old writers on medicine recognised no distinct class of alteratives, but they included them under other remedies. Alteratives do not cause profuse evacuation, nor do they materially disturb any of the usual functions of the body. It is expected that when an alterative medicine is given, the disease will gradually yield without any disturbance of the normal physiological actions, although such may possibly happen when mineral doctors administer mercury, &c.; but as we are now concerned only with vegetable alteratives, such exceptions need not be taken into account. Abernethy and other writers limited the use of alteratives to their influence over the digestive organs; but it is now well known that all functional and structural diseases of every part of the body are controlled by them.

Every practitioner accustomed to treat chronic affections must have seen their progress arrested by the use of alteratives. Their influence over the organic, nervous, and vascular systems is evidenced by the fuller pulse, increased warmth of the skin, the abatement of irritability, and the abatement or removal of deranged sensations in different parts of the body. When used in extreme quantities, or continued too long, the disease is rendered more violent. This rule is more important in acute than in chronic diseases. In chronic affections there may be congestion or inflammation requiring *local treatment*, in addition to the use of alteratives. Gentle laxatives are very useful adjuncts to tonic vegetable alteratives. Too much importance can hardly be attached to the careful observance of diet during the administration of alteratives. The food must be adjusted to the nature of the disease. As a rule, a nutritious diet of due proportions of animal and vegetable substances will be best suited to the management of chronic affections. Proper exercise should also be taken, and due attention to all those hygienic rules which have been found essential to the preservation of health. No alterative medicines can be expected to be of much avail unless such rules are heeded. The allopathic practitioners consider certain mineral alteratives to be almost specifics, as arsenic in certain skin affections, mercury in venereal cases, iodine in scrofula, sulphur in itch, and iron in *ancœmia*, &c. The herbalists' pharmacopœia abounds in alteratives, leaving no excuse for persons who resort to the minerals just named. Sarsaparilla, cleavers, mezereon, queen's-delight, dulcamara, podophylline, guicum, burdock, yellow dock, culver-root, poke-root, and many others, commend themselves to those who leaving the natural medicines, turn to the most injurious so-called remedies which the researches of man have brought to light.

MEDICAL HERBS.

The following Chapters are taken from Mr. Roland Kiley's recipe book.

In the future, Medical Botany will be much resorted to by invalids, and therefore such chapters as the following will be found extremely useful.

THE HERB MULLEIN.

There are various kinds of mullein, and all of them are useful to the medical herbalist. The varieties of mullein most useful are—the great mullein, the white mullein, the the French mullein, the rusty mullein, and the dark mullein. This plant is common to many parts of England and is found in many places abroad ; one variety is found in France, another in Madeira and Canada. The white kind is found in Kent, and the yellow kind in Norfolk and Suffolk. It flowers in July, attains a yard high, and is regarded as one of the most magnificent of British herb plants. The dark mullein flowers about midsummer, and lasts till September ; it abounds in Kent, and has been found in Cambridgeshire, Surrey, Sussex, Middlesex, and several other parts of the country. The moth mullein flowers from July to November, and is found in Germany, Switzerland, and England ; it has often been found about Plymouth and Ashburton, in Devonshire. It is a very ornamental flower for the garden. The virtues of mullein are many; and if its efficacy in chest complaints was thoroughly known, the demand would be greater than the supply. Doctors Howe and Withering have written much concerning the medical virtues of the plant, and each of them recommend it for hæmorrhoids or piles, and for diarrhœa; but its principal use is in the disorders of the chest. In Norway it is given to cows that are consumptive, for which purpose likewise it is often used in England; hence it is frequently called lungwort. Persons suffering from pulmonary complaints would do well to give this herb a trial. The plant can be easily grown; it requires very little care, and may be placed in the borders of large gardens. The scent of the flowers is somewhat like violets. The names given to the plant in different parts of the country are very numerous. Some of them we give:—High taper, tarches, bullocks, lungwort, hare's beard, and ladies' foxglove. Most of the species may be sown in August, and transplanted in February, and placed fully two feet asunder. They will flower about midsummer, and ripen seeds towards September.

The great mullein is much used; the leaves and the whole of the herb are used both internally and externally. A pint of cow's milk, with a handful of the leaves boiled in it to half a pint, sweetened with sugar, strained, and taken at bed-time, is a pleasant and nutritious medicine for allaying a cough, and more particularly for taking off the pain and irritation of the piles, to which it is often externally applied; it is also used as an injection in tenesmus. In diarrhœa of old standing the decoction is employed to mitigate the pain of the intestines. For this purpose two ounces of the leaves are boiled in a quart of water, and four ounces are given every three hours. It is well known to the country herbalists under the name of murrain grass, which is a corruption of mullein. The French call it *bouillon blanc*, and use an infusion of the flowers in coughs, supposing them to possess anodyne and pectoral virtues; but it does not appear to possess much cotic power. It is good in nervous disorders, and few things are better against inveterate headache, for which purpose it is best taken in powder, about a scruple for a dose, and the use of it continued for some time. The juice, boiled to a syrup with honey, is excellent in coughs and other disorders of the lungs; and a strong infusion of the leaves is good against obstructions of the spleen. It is a powerful astringent. The root, dried and powdered, is good in the body-flux, after the bowels have been emptied of their acrid contents by means of a gentle dose or two of rhubarb. The dose is 15 grains, or a scruple The juice of the root, expressed with red wine, checks immoderate flowing of the menses, and is alone a most excellent medicine for spitting of blood. The seeds are said to stupify fish so much that they may be taken with the hand. In the East Indies there is a prevailing superstitious notion among the natives of the efficacy of this plant in protecting them from the visitation of evil spirits. Many of the country people are so well acquainted with the utility of this plant that they esteem it highly. We have used it in our practice with the best results. In most cases of blood-spitting the syrups should be quickly and largely used. The leaves can be used as an external application for piles; and in obstinate cases of diarrhœa a decoction of two ounces of leaves to a quart of water can be taken to the extent of a full pint daily. It will be necessary to use it in conjunction with medicines which move the phlegm and soothe the system.

COLCHICUM.

This plant derives its name from Colchis, a city in Asia, where it abounds. It is also called coum and colchicum carmus. Many authors unite in calling it a native of Europe. It is a perennial bulbous plant, the leaves of which appear in spring and the flowers in autumn. The medicinal parts of the plant are the bulbs and seeds. The flowers possess the same virtues as the bulbs and the seeds. Botanically speaking, the bulbs of the colchicum, as found in commerce, are not the roots; the roots are the fibres attached to the base of the bulbs. The bulb is of the size of a walnut, compressed on one side, convex on the other, of a yellowish colour, marked with uniform furrows, of a strong unpleasant smell, and a nauseous taste. The seeds are almost round, wrinkled, of a brown colour, and excessively tough. The taste at first is nearly imperceptible, afterwards very acrid. Galen alludes to the poisonous qualities of this plant. Dioscorides describes it under the name of colchicum ephermorum and wild bulb, and states that it is found in Messenium. He says that its poisonous effects are similar to those of mushrooms. He proposed milk as the best antidote. Many other early writers have alluded to its medicinal virtues; yet it fell into disuse for a long period previous to 1783, when it was used as a preventive against the plague. In 1763 Stork advocated it as a remedy for dropsy, gout, and chronic catarrh. Since the last-named date nearly every writer on therapeutics has devoted some time to the special study of colchicum and its effects on the human frame. We give, as briefly as possible, the conclusions arrived at and upheld by most practitioners as to the effects of, and the mode of administering, colchicum. The nervous system is seldom much affected by medicinal doses of colchicum. In a large series of cases it was found that, although the digestive functions were deranged, those of the nervous system were unimpaired. Headache and vertigo are produced by this medicine.

Sir Everard Home was the first to notice that it reduced the frequency of the pulse, in 1816. This effect ceases as soon as the medicine begins to poison. Dr. Maclagan took 20 minims of tincture of colchicum on two different days, between the hours of six and eight in the evening, and found that by midnight his pulsations had diminished six or seven per minute. It increases uric acid in the urine. It causes violent retching and vomiting and diarrhœa. In only one case has it been known to produce numbness of the hands and feet. Spasms of the muscles of the legs and arms, and even entire loss of muscular power have been produced by it. When used in large doses, it has produced death in about thirty hours. This medicine is exceedingly useful in cases of gout; it will *prevent* as well as cure gout. When it purges, it has reached its limit, and is really acting upon the system as in a curative manner. Many practitioners assert that it acts best when it causes the least evacuation, and produces very little other sensible effect upon the functions. It should never be given till the bowels have been gently acted upon by a mild purgative, The first doses of the medicine should be small; they may be gradually increased. Colchicum should always be first given alone, to see whether it agrees with the patient. If it excites nausea or vomiting it should be discontinued. When it increases the urine, and causes an abundant discharge of the bile, in addition to a free action of the skin, its action may be regarded as favourable. Like digitalis, it is apt to accumulate in the system. It has often been used in neuralgia. Our advice to the reader is to use it as little as possible: it is a risky medicine to use. Although it has been found useful in rheumatism, gout, scarlatina, confluent small-pox, and even in lock-jaw, yet its effects cannot always be relied on as being harmless. When too much has been taken, strong coffee or ammonia prove good antidotes. We avoid the drug entirely.

PREPARATIONS: Extract—dose, 1 to 2 grains; tincture of colchicum seeds, from 15 to 30 drops; wine of colchicum, 10 to 30 drops. It should never be administered to aged or weakly persons.

VIRGIN'S BOWER.

There are many species of this shrub, most of them climbing shrubs, though some of them are erect. The most important species are—evergreen virgin's bower, purple virgin's bower, feathery-flowered virgin's bower, curled virgin's bower, and common virgin's bower. Of the erect species there are—upright virgin's bower, and entire-leaved virgin's bower, &c. It is found in many parts of the world. It is called clematis, from the Greek word *klema*, a tendril, because it climbs round everything in its way. It is called "the traveller's joy," from its usual place of growth, the road side, and being likewise exceedingly fragrant.

The leaves are the parts generally used, and they should be gathered when they are fully grown. They should be spread in the shade, and, after drying thoroughly, closely pressed and packed in firm papers to exclude the air as much as possible. Sometimes they are put into close glass jars, whose mouths are sealed or covered with oiled silk, bladder, or other impervious material. One variety of this shrub was anciently accounted very efficacious in syphilitic cases, and in ulcers and cancers. It would raise a blister if applied to the skin.

There is one class of disease that virgin's bower should nearly always be used for—viz., uterine disorders. Its use as a nervine for weak females has, in most cases, proved satisfactory. There are no parts of the human frame whose functions are more under the control of the nerves, or which, when deranged, react with greater force upon the nerves, than the reproductive organs of the female; and any remedy which will soothe and quiet the excitable nerves of those organs, when suffering from derangement, must be of great service in allaying those pains and uneasy sensations which have their origin in those organs. When the nerves alluded to are greatly weakened, when their substance or functions are deranged by disease, there is often more intense suffering (mental and physical) experienced by a female than, perhaps, under any other circumstances. Excessive irritability, sleeplessness, great depression of spirits, an over-heated imagination, causing groundless fears, &c., are common results of such a condition of body. Owing to the natural reluctance of females to disclose the full extent of their bodily weaknesses an inefficient medicine is too often prescribed, and the patient therefore continues ill to the end of the chapter. Whenever uterine disorder is suspected virgin's bower can be safely prescribed. It can be used alone, or in conjunction with other medicines.

Take half-an-ounce of the dried leaf, pour on nearly a pint of hot water; cool and strain it; sweeten it to the taste, and take a wine-glassful twice a day at the least. 2. Take half-an-ounce of dried leaf, one ounce of rue, one ounce of skullcap; pour a full quart of boiling water on them; cool and clear. Dose as before. If in addition to the last preparation the patient be advised to sponge the spine with cold water daily, to eat dried fruit, and abstain from slops and heavy meats, the benefit will be certain and speedy.

For Uterine Hemorrhage.—Cold pad to bottom of the spine, and another across the bowels. Head low, and the pelvis raised. The preparation No. 2, with the addition of a teaspoonful of mucilage to each dose, and four grains of gallic acid in warm water, taken three times a day, scarcely ever fails.

SENEGA ROOT, RATTLE-SNAKE ROOT, OR MILKWORT.

There are no less than forty-five species of milkwort. It is one of the most remarkable plants in the botanical pharmacopœia. The different species are natives of the Cape of Good Hope, Siberia, Jamaica, Algiers, Austria, Granada, North America, &c. The fifth, sixth, and ninth species have nearly the same medicinal virtues. Senega root is the 32nd species; it is a native of North America. There is a species called bitter milkwort, which contains the same virtues as senega root; it is found in France, Switzerland, Austria, and Piedmont. When chewed, it diffuses itself over the whole of the jaws, and the effect continues a long time. It is very useful in pleurisy, milk fevers, and pulmonary consumption. Another species, called common milkwort, possesses the virtues of senega, though in a much less degree. It is found in England, Barbary, and most parts of Europe: it flowers in June and July.

The senega flowers in spikes. The stem is quite erect and simple; the leaves are broad; the root is quite contorted, and about the thickness of a finger, and covered with ash-coloured bark. It flowers here in July, but does not produce ripe seeds. The root of this plant was first introduced to physicians over one hundred years ago by Dr. John Tennant, whose intercourse with the Indians led him to discover that they possessed a specific remedy for the bite of the rattle-snake, which was, for a reward revealed to him, and found to be this plant. He was afterwards fully convinced of its efficacy from experience; and, observing the symptoms which were generally produced by the plant, he inferred that these disorders might be removed by it.

It was well tried in pleurisy by Tennant; and several French academicians and others all testified to its good effects. It was then tried in inflammatory disorders, particularly rheumatism. It is useful in dropsies, and it increases the secretion greatly; it produces a plentiful spitting, and increases perspiration, and will even cause purging and vomiting. It also renders the blood more thin. The dose is nearly half-a-teaspoonful of the powder, or three table-spoonfuls of the decoction, prepared by boiling an ounce of powder in a quart of water till it is reduced to a pint. The seed of this remarkable plant rarely grows in England; the roots are generally brought from America. It is mentioned in all the pharmacopœias except the Belgian and French. It is now used by the faculty in the form of powder infusion and tincture. The dose of infusion is two ounces; the dose of spirit is half-a-drachm. In these forms it will be found beneficial in bronchitis. To make an infusion, use one ounce of senega, and 20 ounces of distilled water; infuse one hour, then strain. As a powder, half-a-teaspoonful in half-a-cup of water three times a day. It can be taken with milk. It has a pungent taste, and does not often sit well on the stomach.

MEZEREON.

Mezereon is a shrub growing in gardens to the height of five or six feet, with a strong woody stalk, putting out branches on every side, so as to form a regular head. The flowers come out before the leaves, very early in the spring, in clusters, and surrounding the shoots of former years. In its wild state it is only from one to two feet in height. There are two principal varieties of the mezereon —one with a white flower succeeded by yellow berries, and the other with peach-coloured flowers and red paint; sometimes the flowers of the latter are deep red. Mezereon is a native of Lapland, Sweden, Denmark, Germany, and Switzerland. It is also found in many parts of England. The branches of it afford a good yellow dye.

The whole of this vegetable is extremely acrid, especially when fresh, and, if retained in the mouth, excites great heat and inflammation, particularly of the throat and fauces. Both the bark and the berries of mezereon, in different forms, have long been used externally in cases of obstinate ulcers and ill-conditioned sores. In France the bark is used as an application to the skin, which, under certain circumstances, produces a copious discharge without blistering. In England the mezereon has been principally employed in syphilitic cases; and in this way Dr. Donald Munro was the first who testified to its efficacy in the successful use of the Lisbon diet-drink. Several cases were afterwards published by Dr. Russell, then physician at St. Thomas's Hospital, fully establishing the utility of the bark of mezereon in venereal diseases. In the above cases the decoction of the root was made use of. Dr. Cullen informs us that Dr. Holme has not only found the decoction of mezereon to cure schirrhous tumours, which remain after the lues venerea, and after the use of mercury, but that it has also healed them when proceeding from other causes. The considerable and long-continued heat and irritation that is produced in the throat when mezereon is chewed induced Dr. Withering to give it in a case of difficulty of swallowing, apparently the effect of a paralytic disorder. The patient was directed to chew a thin slice of the root as often as she could bear to do it, and in about two months she recovered her power of swallowing. This woman bore the pain of irritation, and the ulcerations it occasioned in her mouth, with amazing fortitude; but she was almost reduced to a skeleton, and had for three years before suffered very much from hunger without being able to satisfy her appetite; for she could not swallow solids at all, and liquids only with the greatest difficulty; she was attacked with the complaint after lying in. An ointment prepared from the bark or the berries has been found serviceable to sore ulcers. A decoction made of a drachm of the bark of the root, in three pints of water, till one is wasted, and this quantity taken daily for a considerable time together, has been found very efficacious in resolving and dispersing venereal swellings.

Passing by the crude nonsense that has been written of this vegetable we may safely say that it is exceedngily useful as a stimulant, acting on the kidneys. It is one of the ingredients used for preparing the compound decoction of sarsaparilla. In that form it proves useful in scrofula, rheumatism, skin diseases, and venereal complaints. Applied to the skin, it acts as a blister; for that purpose the bark is soaked in strong vinegar and pressed to the body. It also enters into the composition of the mustard liniment in the proportion of 40 grains of ethereal extract of mezereon to one drachm of oil of mustard, two drachms of camphor, five drachms of castor oil, and 32 drachms of spirit. This preparation forms a good stimulating liniment. For internal purposes the bark of the root should be used. It should rarely be used alone. Although it is the fashion to use this root sparingly and cautiously, the birds greedily devour the berries as soon as they begin to ripen. Should any person incautiously place a berry in his mouth he is not likely soon to forget it. Mezereon, as a blister, should be resorted to only in cases of real necessity ; for that part of the body which is often blistered is sure to be weak.

VEGETABLE EXTRACTS.

Vegetable substances, when macerated in water, dissolve; and if the water is evaporated, a residum remains, which is called vegetable extract. As vegetables differ considerably, however, according to the families to which they belong, and to the nature of the soil and climate in which they have grown, it is obvious that this extract must also vary according to the plants which have been employed in its production. It was necessary, therefore, for the purposes of chemical accuracy, to endeavour to ascertain whether there exists in extracts any peculiar and definite principle, independent of such accidental ingredients as have been now alluded to, and which might itself be regarded as the true extractive principle. With this view, Vauquelin commenced a series of experiments, chiefly upon the sap and expressed juices of plants, during the process of which he remarked that they always began to acquire a darker shade of colour from the moment they were exposed to the air, and that during the evaporation a brown or reddish pellicle was found on the surface, which afterwards broke into flakes and remained insoluble. Similar appearances were observed in medicinal extracts; and the longer the evaporation was continued, the more the insoluble flakes were found. This was accordingly regarded as a detection of the true extractive principle ; and the formation of the pellicle and flakes were found to be the result of its absorption of a portion of the atmosphere, to which it was thus found to have a strong affinity. This extract, is thus distinguished. It is soluble in water when directly obtained from the vegetable, but becomes afterwards insoluble in consequence of the absorption of oxygen from the atmosphere. It is soluble in alcohol, and unites with alkalies, forming compounds which are soluble in water. When distilled it yields an acid fluid, impregnated with ammonia, and seems to be composed chiefly of hydrogen, oxygen, carbon, and a little nitrogen. This extractive matter is found in greater or less quantity in all plants, and is very generally an ingredient of the saps and bark, particularly in the barks, of an astringent taste ; but yet it is not exactly the same in all plants, even when separated from all impurities.

RECIPES.

1. –FOR IRRITABLE COUGH.

The following recipe is for a cough when the lungs are irritable, and the cough lasts long or comes on suddenly.

Fluid extract of blood root	2oz.
Fluid extract of squill	2oz.
Fluid extract of ipecac	2oz.
Balsam of tolu	1½oz.
Syrup	10oz.

Dose : One-third of a teaspoonful when the cough is troublesome.

2.—FOR DIPTHERIA.

Gargle or wash the inside of the throat with a teaspoonful of tincture of cohosh diluted with as much water. Commence with the first symptoms of soreness or inflammation. Do not swallow any of the gargle.

3.—FOR HAIR POMATUM.

This pomatum is a most excellent one for promoting the growth of the hair :—

Almond oil	4oz.
White wax	½oz.
Clarified lard	3oz.
Liquid ammonia	¼oz.
Otto of lavender and cloves, of each	1 drachm

Place the oil, lard, and wax into a jar, which set into boiling water. When the wax is melted, allow the grease to cool till nearly ready to set; then stir in the ammonia and the perfume, then place it in small jars for use. Never use a hard brush, nor comb the hair too much. Apply the pomade at night only.

4.—FOR RHEUMATISM.

The following preparation is for internal medicine:—

Dulcamara root - - -	6 drachms.
Sassafras bark - - -	3 ,,
Guaiacum chips - - -	3 ,,

Boil in three pints of water down to a pint and a half. Dose: Two table-spoonfuls three times a day.

5.—RHEUMATIC EMBROCATION.

In addition to the internal medicine, the following embrocation should, in severe cases, be resorted to:—

Oil of hemlock - - - -	1oz.
Gum camphor - - - -	$\frac{3}{4}$oz.
Tincture of myrrh - - - -	1oz.
Tincture of cayenne - - -	$\frac{1}{2}$oz.
Strong ammonia - - - -	1oz.
Olive oil - - - - -	6oz.

This will make a most active liniment. It should not be used too often. It should not be rubbed in with the naked hand. If it should prove too strong for the patient, the ammonia may be reduced $\frac{1}{2}$oz., and then be mixed with 2oz. of water. Shake the mixture well before using it, so that the ingredients may get thoroughly blended together. It will be found more efficacious than nine-tenths of the so-called rheumatic specifics.

6.—SLEEPLESSNESS AFTER INTOXICATION,

IN CASES OF DELIRIUM TREMENS, ETC.

Take two scruples of cayenne pepper, and infuse in a pint of boiling water. When cool strain it, and make it into punch, adding sugar and lemon to suit the taste. It is very palatable, and will be taken freely by the patient.

7.—SLEEPLESSNESS IN NEURALGIA.

Take from 15 to 20 grains of valerianate of ammonia in one table-spoonful of infusion of valerain every two hours.

8.—FOR CONSTIPATION.

Concerning the diet, the most certain means of overcoming constipation is to partake largely of vegetable diet. Raw fruit and herbs are chiefly useful. To cause a looseness, or diarrhœa, is not the way to cure costiveness, but to substitute one complaint for another. Milk should be freely taken if it agrees with the stomach. Bran bread, made of three parts flour and one of bran, should be eaten. Oatmeal should be frequently taken for supper.

9.—FOR INFANTILE CONSTIPATION.

Senna leaves - - - -	1½oz.
Ginger - - - - -	30gr.
Liquorice root - - - -	2oz.
Boiling water - - - - -	12oz.

Infuse half-an-hour and strain. Dose: One table-spoonful, to be followed by a little warm tea.

Adults who suffer from habitual constipation should properly diet themselves, and resort to purgative medicine as rarely as possible. An ordinary purgative pill, or double the dose ordered for children, will serve the purpose.

10.—FOR SORE EYES.

This complatnt is seldom a local one; other parts of the system are generally affected at the same time. Strengthen the system by a timely course of tonics, and bathe the eyes morning and night with the following wash:—

Marsh-mallow	1oz.
Hops	½oz.
Poppy-heads	¼oz.

Infuse in a pint of boiling water thirty minutes; then sponge the eyes well with the clear liquid. Immediately after, wash the eyes with cold spring water, or other clear water when spring water cannot be procured.

11.—FOR BAD BREATH.

Keep the bowels regular. Wash the mouth often with water in which a little powdered myrrh has been dissolved. Then take—

Peruvian bark	1oz.
Rosemary	¼oz.
Cherry bark	1oz.
Horse-radish root	¼oz.

Infuse in a pint and a half of boiling water for one hour. Strain, and add 2oz. of tincture of myrrh. Dose: One table-spoonful four times a day. Eat dry food, such as biscuits, dry toast, lean meat, and raisins.

12.—FOR WARTS.

Prick them slightly; then wash them with tincture of myrrh. Continue it daily until a cure is effected.

13.—FOR BLOODY FLUX.

Avoid solid food while the complaint lasts. Keep up the natural heat of the system. Drink freely of infusion of yarrow mixed with a little liquid gum arabic—one teaspoonful of the gum to a gill of the infusion. Slippery-elm gruel can be taken instead of the yarrow and gum; to be followed thirty minutes after by composition tea. For diet, give nourishing broths, &c.

14.—SOOTHING OINTMENT.

Red poppy flowers	1oz.
Elder flowers	1oz.
White wax	6oz.
Olive oil	1oz.

Gently simmer the flowers and wax for one hour, strain, add the oil, mix the ingredients thoroughly, and keep it in a cool place.

15.—TOOTH POWDER.

Powdered myrrh	2oz.
Powdered cinnamon	¼oz.
Powdered charcoal	¼oz.
Powdered bayberry	2oz.

15

Tincture of arnica, 6 fluid drachms; water, 8 fluid ozs.; Mix. *As a lotion in sprains and contusions.*

16.—AN ASTRINGENT GARGLE.

Take of tannin 1 drachm, of acid infusion of roses 6 fluid ozs. Mix the gargle frequently. *In relaxed throat.*

17.—DIURETIC MIXTURE.

Uva Ursi leaves	1oz.
Juniper berries	1oz.
Gravel root, sliced	1oz.
Parsley root	1oz.
Pennyroyal	1oz.
Spearmint	1oz.

Boil in one quart of water down to a pint. Dose: a wineglassful four times a day. This mixture is very useful in dropsy, gravel, and difficulty in passing urine.

19.—COUGH PILLS.

Lobelia	¼oz.
Ammoniacun gum	¼oz.
Cayenne	¾oz.

Mucilage of Gum Arabic, sufficient to make a mass; divide it into pills. Dose: two, three, or four times a day. Use, for chronic coughs, spasmodic asthma, and affections of the chest.

20.—POWDERS FOR AGUE, CHILLS, &c.

Peruvian bark in powder		2oz.
Prickly ash bark	,,	½oz.
Lobelia seed	,,	¼oz.
Ginger	,,	½oz.

Mix a teaspoonful in tea every 4 hours.

CRANIOLOGY OF GREAT DRINKERS.

Dr. J. S. Wright, professor of surgery in the Long Island College Hospital, of Brooklyn, N.Y., has lately made some original studies of the heads of inebriates, comparing them in size and special developments with those of epileptics and others. The following is a *résumé* of his conclusions :

He assumes that any organ which has notably deviated in conformation and volume has also deviated in function. That the brain may deviate from the standard of conformation and volume. That any organ of the body has in health a fixed, though variable conformation and volume ; and a constant, though variable function. The first question to be solved was this : Does the confirmed inebriate have an abnormal conformation of the brain ? In answer the heads of thirty-five confirmed inebriates, inmates of the inebriates' home at Fort Hamilton, N.Y., were measured and compared with similar measurements of thirty-five uneducated men. The average weight of the inebriates was found to be less, owing to the derangement of nutrition and general health, but the average height was greater. The head of the confirmed inebriate had a greater circumference than the head of the uneducated man, but this measurement cannot be depended upon as an index of the volume of the contained brain. The conclusions were, namely :

1. The uneducated man has a greater volume of brain in the anterior part of the cranial cavity than the confirmed inebriate ; also a greater volume in the posterior part of the cranial cavity.

2. The confirmed inebriate has a greater volume of brain in the middle part of the cranial cavity than the educated man ; also in the middle region of the head the vertical diameter of the inebriate is greater.

Hence it appears that the brain of the inebriate is a deviation of both organism and function. In the majority of cases the conformation and the volume of the brain are attained by the time the individual is twenty-five years of age ; hence the inebrity may not be the cause of the deviation in conformation and volume of the brain of the confirmed inebriate. The causes must operate previous to this date. They must occur during the early life of the individual, or they must be hereditary. In many cases these causes are inadequate to produce the deviations in volume and conformation found in the brain of a confirmed inebriate, hence it is concluded that they are mainly hereditary. It is also thought that the brain of the confirmed inebriate is a poorer order of development than the normal brain.

It follows then that these deviations of the brains of confirmed inebriates are properly to be treated as deceased conditions, and that a confirmed inebriate must be treated as a sick man.

In the study of the question, do epileptics have an abnormal conformation and volume of brain, a large number of cases were examined. The result reached was that the brain in incurable epileptics is a deviation both in structure and function. The outset of the disease is generally hereditary. Given this outset, manifested in the conformation of the brain, we have a basis for the development of epilepsy, or inebrity. Looking upon certain individuals as having heads deviating from the standard of volume and conformation, and finding that they are not adjusted to the conditions in which they live, and that they exhibit abnormal functional manifestations, and seeing that the influences of disease and injury augment their deviations, in a given case of injury or disease we may have in the brain itself an important indication as to what the clinical history may be not only immediately, but during the rest of the life of the individual. Dr. Wright notes also that the average criminal exhibits a deviation from normality ; and concludes that the brains of inebriates and epileptics vary but little, and with slight changes would readily run into each other. The modified brain found in the epileptic often has descended from the altered brain of an inebriate.

HINTS ON MATRIMONY.

Under this head I wish to give a lesson to married and unmarried people ; and, as I have devoted much of my life to the study of human nature, I hope my remarks will be taken seriously. Beaconsfield wrote thus in Contarini Fleming, " For myself I believe that permanent union of the sexes should be early encouraged ; nor do I conceive that general happiness can ever flourish but in societies where it is the custom for all the males to marry at eighteen." Lord Beaconsfield was decidedly wrong in giving such advice, the early union of the sexes should not be too early encouraged. Marriage is a serious matter, and a man cannot use too much caution in choosing a wife, for marriage has been rightly compared to a stratagem in war wherein a man can err but once.

Young men are often told to avoid a scolding beauty as they would a plague. Scolding women are often clever in business matters, and do not deserve the wholesale abuse they receive. The following lines by a well-known writer may prove useful to some of my readers :

SCOLDING ACCOUNTED FOR.

Some years ago it was my fortune, or misfortune, to be associated in the intimacy of family life with a very influential and interesting woman. She possessed rare executive ability, and could "turn off" more work in a given time than any other woman I ever saw. Her husband was a clergyman, but his wife's power over a congregation was far greater than his, and her influence in the parish over which he was installed was fully equal to, if not greater, than his. The larger the occasion, the higher she rose to meet it, and she was never so utterly easy and at home as when the greatest demands were made on her power of self-possession, of fine utterance and of administrative ability. In public assemblies she was captivating; in society, polished and agreeable; but at home she was often the dreadful opposite of all this. She would scold, scold, scold, from morning till night. Her husband was one of the sweetest saints the Lord ever made; but he couldn't please her, and every member of her family in turn experienced the fearful lashings of her tongue. All the time she was intensely religious, always ready for prayer-meeting and devotional exercises of whatever sort, always justifying her motives as being, as no doubt they in fact were, of the very best.

She had a large family, and an income both small and irregular; her husband was a "poorer manager," as the phrase is, and always behindhand and in debt, and she, poor woman, tried out of her superabundant energy and vitality to make up deficiences at every point where they occurred.

It is interesting to me now to recall her manner when she marshalled her forces and started into a piece of work. Every person in the household was laid under contribution and was compelled to contribute to the grand result in some form, by helping directly or by keeping out of the way. When the work began, the scolding began, and the harder the work was pushed the harder the scolding went on.

Years after this experience I became a student of Phrenology, and then I was able to explain to my entire satisfaction why this good woman could be so good, so religious, so consciously devout, and yet at home so utterly disagreeable and intolerably odious. The two organs of Combativeness and Destructiveness in her must have been very large. When she had her executive ability lashed into fury by the stimulus of a big job on hand, the blood in her brain was drawn specially to these organs, first to Combativeness and sympathetically to the contiguous organ, Destructiveness, and so the scolding was entirely accounted for without damaging her Christian character in the least. She was not an introvertive woman, save in emotional matters of a purely religious sort, and she was not a bit philosophical. If one ventured to expostulate with her course, her invariable rejoinder was that "God knew her heart; He knew her motives were pure."

It is often said that young people may safely marry, though there be no love between them. In my long experience as a lecturer I never found that saying to be true, "marrying for convenience or money is sure to lead to misery."

> Marriage is a matter of more worth
> Than to be dealt with by attorneyship:
> For what is wedlock forced but a hell,
> An age of discord and continual strife?
> Whereas the contrary bringeth bliss,
> And is a pattern of celestial peace.
>
> SHAKESPEARE, *Henry VI.*, Part I., Act V.

If a couple regard each other to such a degree that they like to quarrel, in order that they may enjoy the pleasure of reconcilation, they may safely marry. If they greatly fear to have a little quarrel, their love is hardly deep enough for marriage.

There are many excellent women in this world, who seem to have got a whimsical notion in their heads, that if they could only catch hold of a fool, or an easy-going man, for a husband, it would be the very summit of human, or rather matrimonial, felicity! There never was a more fatal mistake than this, and it is one of the means whereby women in their dealings with our sex are often so miserably duped and sacrificed. Men of real sense and talent always make the most ductile husbands. A very foppish man, believe me, has too much opinion of his own dear self, and too little of women to be easily governed.

A very polished brow may often mark the man, who perfects his designs under the pretence of being very humble.

A great deal of character may certainly be gathered from a person's size. I believe myself it may be laid down as an infallible rule, that tall, pale, lean-visaged men will work best with their heads; short, stout, men, with their heads and hands too.

If, therefore, ladies, you want a thinker, or rather a contriver, for a husband, you must look out for a tall, pale lean-visaged man; but if you want a mere husband—one, I mean, who will be fond of home, and not object occasionally to rock the cradle and nurse the babies—you must, by all means, fish for a short, stout one

The plainer and more unsophisticated the visage of a man, the more he possesses of sterling worth and sense. The best apples and potatoes always have the roughest coats. A man, reader, may be every inch a man without the aid of musk or moustachios. He may possess a good understanding, and his heart be in the right place, and that's worth everything!

It is often difficult to learn a woman's real nature till after marriage. Of course the Phrenologist can at once discern a woman's character, but to the non-professional the task is often very difficult. Women can very often read the true characters of their future husbands. Though women are rarely deceived in such matters, they make a bad choice because they are often willing to remain blind to the worst points in a man, believing they can alter his nature after marriage. Such impressions often lead to *utter misery.* If real love before marriage will not cause a man to abandon bad habits, he will likely remain incorrigible after marriage.

I may offend some of my readers by plain writing, but I wish to warn young women against men who encourage them to read lewd literature. There is need for plain speaking on this subject, for reading obscene books is a prolific source of youthful depravity and contamination. Obscene novels and fictitious writings that are full of love stories and lustengendering narratives have a tendency to rouse lewd imaginations or fancies. This class of literature is scattered broad-cast over the land in the shape of trashy romances, exciting seductive stories, and narratives of dissolute characters ; and is allowed to be sold as suitable reading for young people ; while books that would warn the erring from violating the sexual laws are sometimes prescribed. So long as the rising race are allowed to read the corrupting light literature above referred to, so surely will sensuality and depravity undermine the public morals. This kind of literary garbage, like improper aliment for the stomach, is pernicious in proportion to the youthfulness, imaginative, and excitable nature of the persons who partake of it.

Such reading would be less acceptable, and the youthful imaginations less excitable, if parents duly instructed their offspring, when their sons and daughters arrive at the age of puberty. Children should be taught the fearful risks they run, if they excite or tamper with their sexual passions. Half the sexual criminality of our land would be avoided if fathers dared to instruct their sons, and mothers their daughters, concerning the danger of sensual practices.

Henry Ward Beecher says : " What God creates no man or woman need be ashamed to know, and especially where it is knowledge of creations that belong to ourselves, and take hold of the very essence of our being and constitute a part of their function and duty ; and it is a shame that at this stage of civilisation both sexes should not be instructed in these things."

Now I ask, could a father do wrong by instructing his son that certain parts of the blood are round, and that those round corpuscles are changed by sexual diseases into a sprouted shape. When these corpuscles have changed to the sprouted shape you may expect hereditary taints in the blood.

Dr. Miller says, "the human race are wondering and mourning over the mysterious dispensations of Providence in permitting so much disease, and removing from earth so many of the middle-aged and the young; and we are exhorted to consider this a lesson God is teaching to prepare for death. The facts are these: *People destroy their own lives and the lives of their children by their own sexual abuses, and God suffers them to die, because they have so often and so grossly violated the laws, He has ordained that they shall not live.*"

The reader should ponder the foregoing, for the sensual habits of the rising generation call for very plain speaking. Disease is rife; debilitated young men are everywhere met with, and yet the moralist is blamed for pointing out the cause and the remedy.

Let my young friends bear in mind the great distinction between love and lust. Mr. Henry Varley, in his most useful lecture, would fain persuade us that even love is dangerous, if not carefully restrained; while another writer says, "To a man who is in love, the thought of another woman is uninteresting, if not repulsive. Instead of love being the occasion of all the misery of this world, as is sung by fantastic bards, I believe that the misery of this world is occasioned by there not being love enough.

This author is right—between a healthy couple love need be little restrained, but lust or promiscous intercourse should not be thought of, independent of it being sinful, it is dangerous.

"An Arabian chief was once brought before a tyrant and told that he must kiss his tormentor. 'I will do it very gladly,' said he; for he was suffering from the leprosy, but the disease was not visible. He kissed the tyrant, and the latter became a leper. This, you say, is unjust on the part of Nature. But the possibility of the occurrence of facts like these is Nature's proclamation of the breadth of the distance at which the unclean should be made to stand apart from the clean. We read that men were once obliged, when lepers, to fall down with their faces to the ground, and call out 'unclean, unclean,' when in the presence of the healthful. This was Nature's law, and she adheres to it to-day, and when it is violated exacts fearful penalty."

May a word to the wise prove sufficient.

Now a few words on another topic.

Sometimes the hearts of the parents are broken, because one or more of their children are deformed. This is a delicate topic, for there are many unfortunate weaklings, whose sufferings are the result of pure accident However no harm can be done by offering a few words of caution.

The following anecdote from the writings of Goethe will need no comment.

"Listen," says Goethe, "and let me imitate the speech of the poor. I have heard of an Irish mother who had a malicious child and a kind child. She was asked to account for the difference of disposition between the two. 'I know nothing of the cause,' she said, 'only this little Kate will strike her knife into the shoulder of my little Mary. I know nothing of the cause. The good God gave me both of them. How should I know the scource of her disposition? Look into her brown eyes; there is a leer of malice in them.'"

Goethe says he studied this case, and finally the poor Irishwoman explained it unconsciously. He asked her a question—"Were you happy in the summer and winter and spring before this child's first summer?" "Happy, is it you say, sir? An' shure, whin me husband was tuk up wid another woman, how could I be happy? An' he a-spending his money on her, too, an' the wages got lower; an' it's not the money that riled me neither, it's me as was but a few months married, an' in a strange counthrie, an' he a-riding more than three times wie her in a chaise, is it. Och! but he'd been over and larnt the wicked ways before iver he brought me here. Faith, me heart was broken, it was, an' I hated that woman so, I was longing all the time to lay me hands on her. I'd liked to have murthered the old fiend, an' I wanted to go to the factory an' inform on her; but me husband cursed me, an' threatened to kill me if I did." "Pardon this rude language of the poor," Goethe says to Angelo, who loves the soft Italian speech. "And was he still behaving so badly in the summer before Mary's first summer?" Goethe asked her. "The saints be praised, no. The woman moved away. Bad 'cess to her! and Patrick gave up his bad ways afther, and trated me rale well, too. The baste of a woman niver came back. and I tuk no more trouble consarning her."

Will the reader not see why Kate was murderous, while Mary was harmless? One more anecdote on this subject. Some years ago, while lecturing in Yorkshire, in the neighbourhood of Sheffield, I was requested to lecture to men only on the subject of "vital force." At the close of the lecture a child was handed up to me, and I was requested to look into his eyes : I tried to do so, but he persistently turned away his head. He had very strong muscles, and a wilful temper. He had not spoken from birth, although he was upwards of 5 years old. I soon learned the reason of his peculiarities. While his mother was pregnant the father was clinging to a business which was being carried on at a loss. The mother protested, but without avail ; and ultimately the parents sulked, and abstained from speaking to each other for three months. The effect on the coming child has heen described. Probably the child will grow up a strong, but dangerous mute, refusing to look even at his parents. Let parents take warning, for I could narrate many sad cases arising from the same cause.

THE UTILITY OF PHRENOLOGY.

To the mind of a believer in phrenological truth, the cause of the prevalence of vice and crime in Christendom becomes perfectly obvious. He sees that the intellect has been cultivated while the moral powers have been left to the guidance of mere reason. Moral science has been taught in our institutions of learning, on the false principle that justice among men is the result of intellectual culture. To erroneous interpretations of Scripture and heathenish theories of mental philosophy may be ascribed the failure in great part of our public instruction to render men "a law unto themselves."

Until the discovery of Phrenology by Dr. Gall, educators had no guide to direct them in the safe road that leads the young to the temple of virtue. They were blind guides, not having the light of science to show them that conscience is an innate sentiment of the mind, and needs something more than a command to make men abstain from committing evil.

When conscience shall be recognized as a faculty of the soul to be cultivated, as has recently been denied by a distinguished educator of Massachusetts, and proper means are used to train this feeling, as we would train courage, love, fear, hope, or kindness, we may then expect the oft-disputed statement of Solomon to show itself to be true, viz.: "*Train* up a child in the way he should go, and when he is old he will not depart from it." Our schools *instruct* the intellect, and stop; they do not *train* the moral feelings. The difference between instruction and training is great. We train horses, dogs, and oxen, and they obey us. We instruct children in intellectual matters, but we fail to train them in morals, at least in the public schools. We submit, that nearly all the *training* pupils get in school is addressed to fear, ambition, or shame, through the system of "*marks.*" When does a teacher appeal to conscience, the law-keeper of the human mind? When is a pupil trained to do right because it *is* right? We remember how the restless or playful child was put to shame by being seated in the middle of the room on the "dunce block," and made to wear the "fool's cap," and the whole school was permitted to laugh the delinquent to scorn. This was simply mortifying the love of Approbation through shame, while the industrious and orderly were recompensed by praise "marks," through the same faculty, Approbativeness. Sometimes Cautiousness was painfully appealed to by the whip, but conscience rarely, if ever. Hence the cunning of the child was aroused to avoid detection and consequent punishment by any trick he could invent, or any falsehood he might utter. Intellectual culture, therefore, separate from the faculty of conscience, simply qualifies men to commit crime all the more successfully. Hence we find adept thieves, bank robbers, wholesale swindlers, and the worst of libertines among men of high intellectual culture.

We come now to a remedy for the evils that afflict society from immoral practices. And it can be found by giving proper instruction to the young in a moral point of view. And this must be done in our public schools. Immoral parents will not teach their children morals, either by precept or example; and they can have but little practical instruction in goodness at the average Sabbath-school, which is open for an hour or two in a week. When children are taught morality from Monday to Sunday, we may expect a better race of people.

We believe in moral progress, and predict the fulfilment of a day of millennial glory as the Bible teaches; and this long-expected time will be hastened by the aid of phrenological truth. Religion and science must be united; human enactments must be in accordance with the law of God, which is truth, and then war and crime will cease among men. This day of millennial glory lies in the distant future; but the phrenologist can see its dawn by the carrying out of the principles of this heaven-born science, with the proper training of conscience in accordance with the commands of the Decalogue. It will cause a nation of just men to be raised up, who will need no civil enactments to make them yield obedience to the law of God.

P. L. BUELL.

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